SPECIAL ISSUE: TRUE COLOR, GRAPHICS, AND IMAGING

MACWORLD

The Macintosh® Magazine

January 1991 $3.95 Canada $4.95

Shogun

JOHN SCULLEY—
WARRIOR KING

His Year in Review, Page 167

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SPECIAL ISSUE / TRUE COLOR

24-bit color produces dazzling displays and striking output, but you may run into a few roadblocks along the way. Here's what it takes to get your colors flying.

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By Charles Seiter Are color files gobbling up megabytes of precious disk space? Image compression can ease the squeeze on your overcrowded hard drive.

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By Cheryl England Spencer 24-bit color display can slow your Mac to a crawl. Macworld Lab tests seven QuickDraw accelerator boards to find out how well they tackle those system-slowdown blues.

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By Lon Poole *Macworld* referees an image-editing battle between ColorStudio and Photoshop that highlights each program's strengths and weaknesses.

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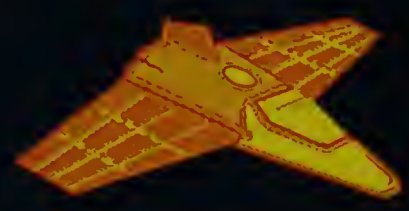

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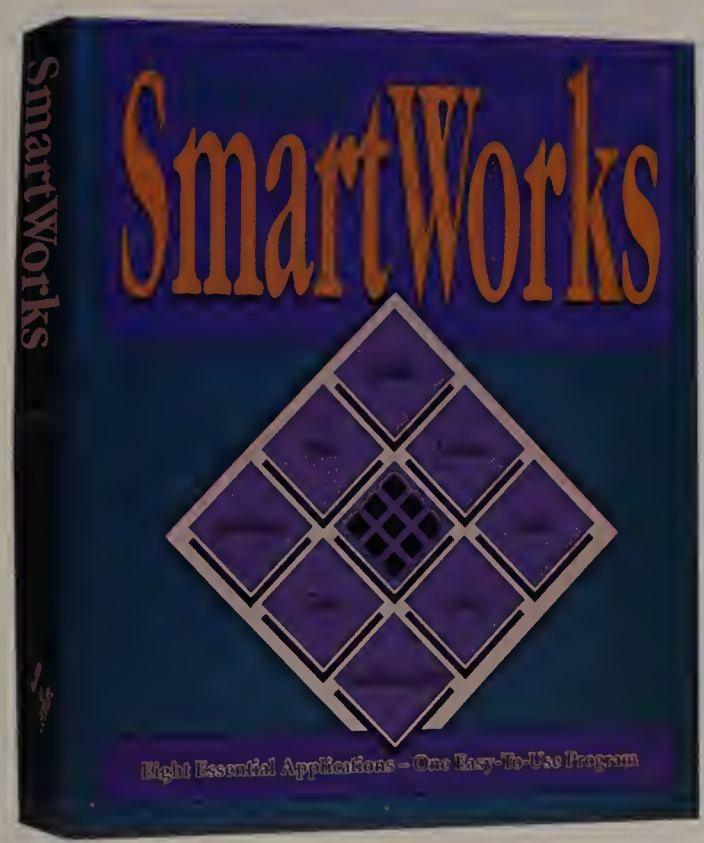

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Steve Rennie, President of REN Management Corporation

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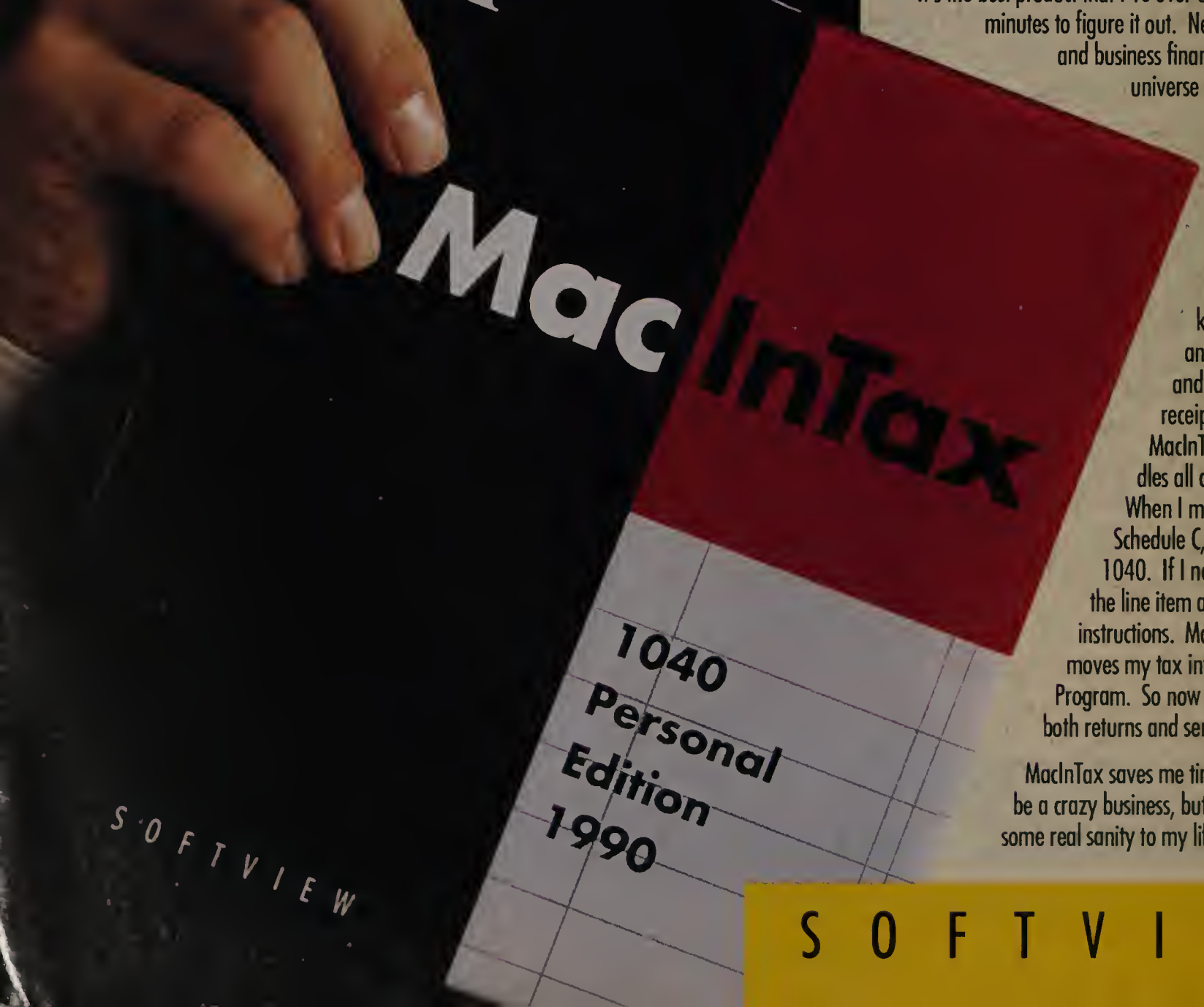

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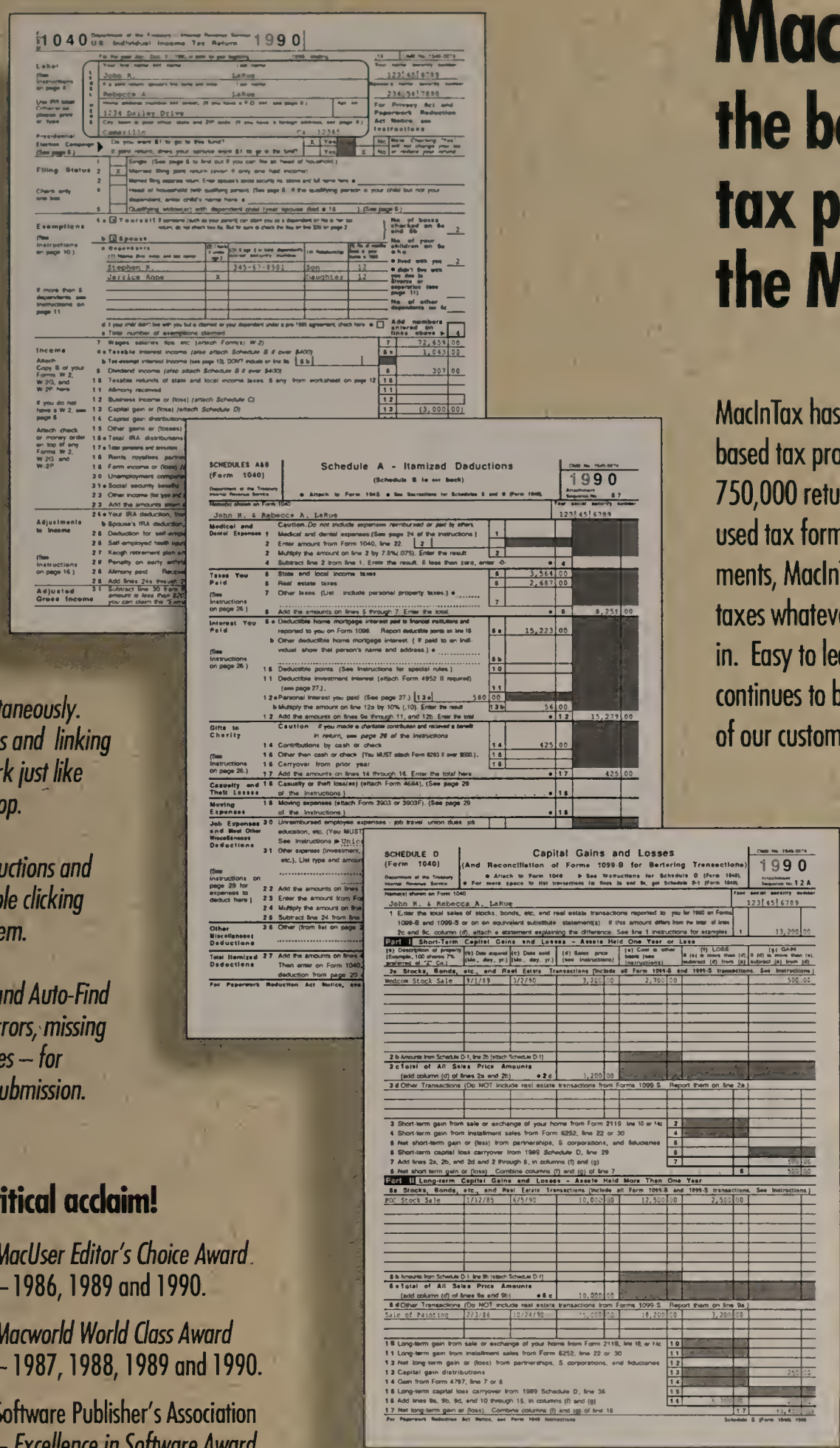

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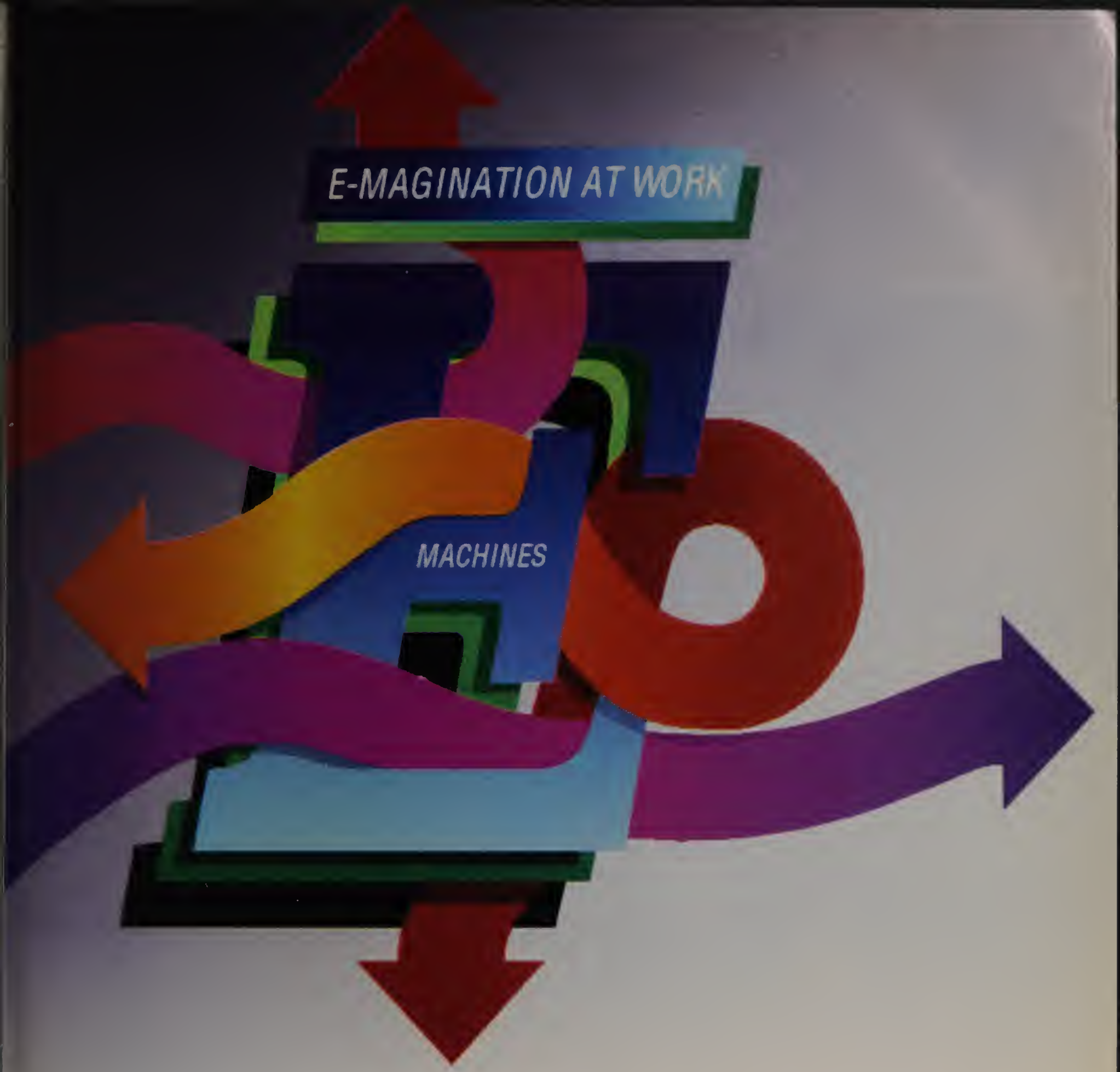

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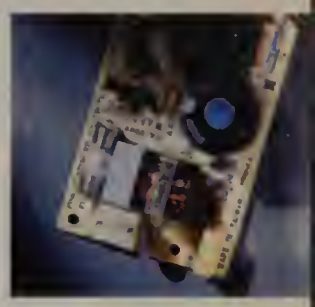

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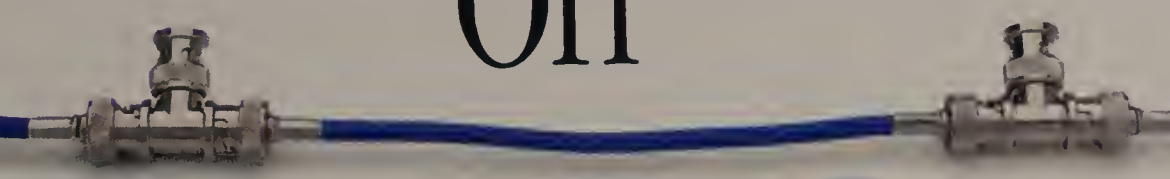

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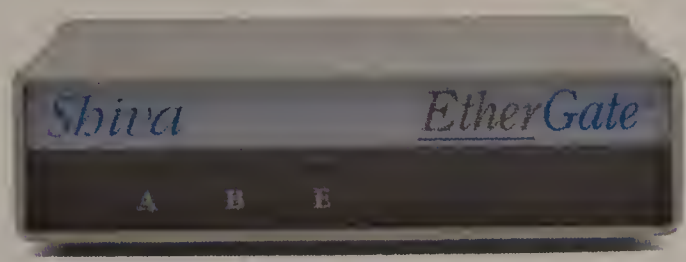
You Need 
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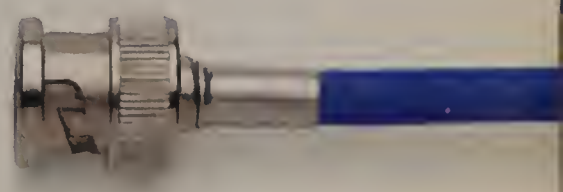

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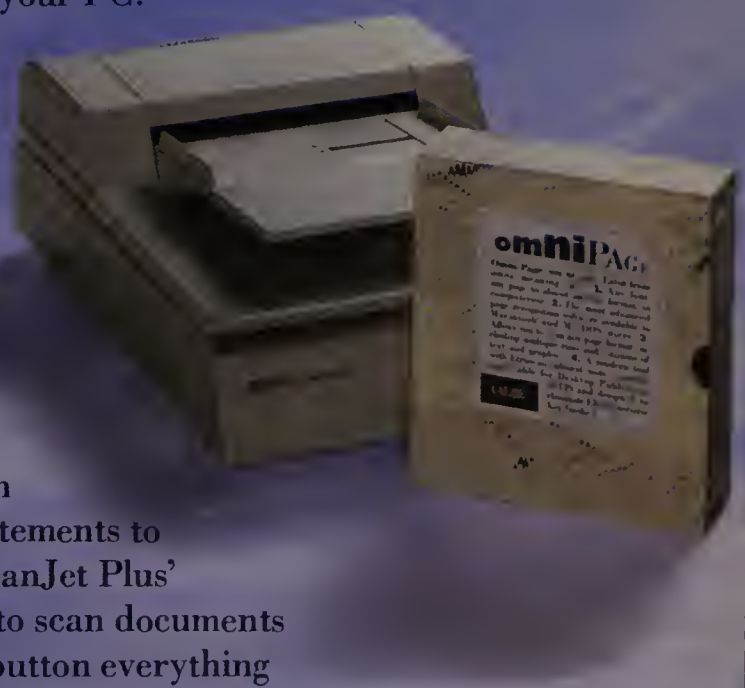

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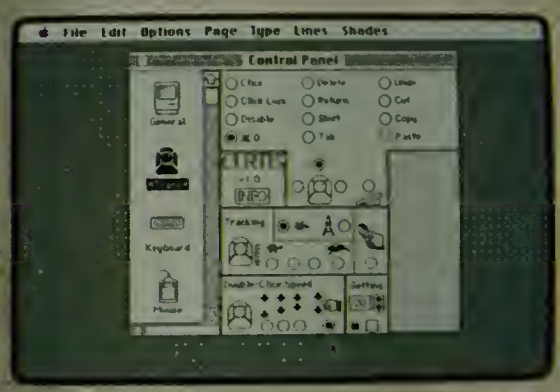

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MacBulletin

San Francisco Debates VDT Law

San Francisco's city government is conducting hearings on an ordinance designed to protect people who work at computers from repetitive strain injury, eye fatigue, radiation, and other computer-related hazards. Unlike the Suffolk County, New York, bill that was shot down by the courts, the San Francisco bill does not require employers to provide vision care. The bill requires that workers be 5 feet away from the high radiation at the side or back of a VDT, but a spokesman for the bill's sponsor said the 5-feet provision is likely to be stripped from the bill before it passes.

Retrofit Device Reduces ELF Emissions

Fairfield Engineering of Fairfield, Iowa, is shipping the Bioshield, a $49.95 device that fits over the neck of the cathode-ray tube inside compact Macs to shield users from extremely-low-frequency (ELF) magnetic emissions. *Macworld*'s test of a Bioshield in a Mac Plus showed a significant reduction in ELF emissions, which have been linked to health problems in some studies. The company said a second model, for the 13-inch Apple color monitor, will ship soon at $69.95. The devices must be installed by the company or by certified Apple technicians.

System 7.0 Goes to Beta

System 7.0's feature set was frozen in late October, and beta should go out to developers in early November. Apple asked developers to have demo-ready 7.0-compatible products by early spring, and said final system software would ship "in the first half of 1991."

Apple Opens Toll-Free Customer Assistance Line

Apple has created the Customer Assistance Center, a toll-free customer-relations line that's available to all Apple customers. Apple emphasizes that the Customer Assistance Center is not a technical support hotline, but rather a backup to existing forms of customer support available from Apple dealers. The service's hours are Monday through Friday from 6 a.m. to 5 p.m. Pacific time. The number is 800/776-2333.

Tactics' Strategy

The sophisticated market-mapping tool Tactician is getting a major upgrade. Version 2.0 adds geo-coding, which systematizes matching up geographical and database information; address matching, which can resolve data down to the house level; and support for massive data files (for example, it can run a query on the United States' 92 million street segments). Finally, Tactician's three-dimensional table adds complete spreadsheet functionality. Pricing was undecided at press time. For more information, contact Tactics International at 508/475-4475.

Motorola 68030 No Longer in Danger

In a move that seems to secure the future of the 68030 processor found in Apple's high-end systems, Motorola and Hitachi have come to a settlement in their mutual suits over rights to microprocessor designs. The two companies filed joint motions requesting that Motorola's original patent suit and Hitachi's countersuit both be dismissed.

Marstek Ships 800-DPI Hand-Held Scanner

A gray-scale hand-held scanner with resolutions from 100 to 800 dpi is shipping from Marstek. Called the M800, the device can scan images that are 4.13 inches wide and up to 24 inches long in one pass. The M800, which provides 64 levels of gray, comes with Digital Darkroom image-processing software and ScanLink, a utility package. The M800 lists for $549. For more information, contact Marstek at 714/833-7740.

SuperMac Will Bundle Compression Software

SuperMac Technology announced that it will bundle JPEG-compatible still-image compression software with all of its color graphics display adapters and storage devices. The software, called SuperSqueeze, was developed with C-Cube Microsystems, maker of image-compression software and hardware. For more information, contact SuperMac at 408/245-2202.

Ready to Upgrade Your Mac Classic?

Dove Computer Corporation has announced a 68030-based upgrade for the Mac Classic. The MaraThon 030 Classic board will include virtual-memory software from Connectix and the SUM disk utilities and SAM antiviral utilities, both from Symantec. The 16MHz board will be able to support System 7.0 when 7.0 is available, according to Dove. Scheduled to ship by January 1, the MaraThon 030 Classic will carry a list price of $799. For more details, call Dove Computer at 800/622-7627 or 919/763-7918.

And Put More Boards into a Mac IIsi?

Second Wave has upgraded its four-slot and eight-slot NuBus expansion chassis to work with the Mac IIsi.

(continues)

The four-slot Expanse NB4 and the eight-slot Expanse II each connect to the single Processor Direct Slot in the IIsi using the Apple NuBus adapter card and Second Wave's NuBus Interface card and cables. Available now, the external boxes list for $1295 for the Expanse NB4 and $2295 for the Expanse II. For more information, contact Second Wave at 512/343-9661.

SoftView Filling In the Blanks

SoftView's if:X—a forms-design system of loosely-tied-together boxes that redistribute themselves as neighbors move—is adding EPSF export for pasting forms into other programs in version 1.1 (available now); the ability to import and trace scanned forms in version 1.2; and in version 2.0 (due in late 1991), complete data-entry capability. For more information call SoftView at 805/385-5000.

Enhance Enhanced

Version 2.0 of the gray-scale program Enhance will have virtual memory management and support 32-bit files. The new version also has a customizable tool palette; multiple undos instead of a buffer scheme; "wet" paint, which lets a new chunk of bitmap behave like an object until it is deselected; intelligent dithering-like algorithms to enhance high-resolution images on screen; and printer and scanner calibration. Version 2.0 also adds more analysis tools, including a densitometry meter and histograms of irregular shapes. Enhance 2.0 will probably list for $375. For more information, call 515/270-8109.

PageMaker Add-Ons Arriving

ElseWare (formerly BenWare) now has two PageMaker-specific utilities. CheckList 1.0, now available as shareware for $45, generates a list of fonts, style sheets, and document links in PageMaker files. Version 2.0 will be a $179.95 commercial product and will support attaching electronic notes for service bureau staff and listing font info from EPSF and PICT files. DataShaper, which lets you preassign style information when placing database information in PageMaker, is being upgraded to version 1.2 ($179.95), featuring a 260-field limit, 4000-character fields, automatic image placement, if/then text operators for managing messy data, and bar code generation for envelopes and labels. For more information, call ElseWare at 206/547-9623.

MicroMac Unveils Headless SE

Start-up MicroMac Technology has introduced the MicroMac SE, an upgrade kit that turns an SE into a transportable system with a separate monochrome monitor. The kit includes the system box, mounting hardware for the user's drives and system board, an autoswitching international power supply, the external monitor, and the DisplayServer SE, a flexible display adapter from Lapis. The list price for the MicroMac SE with 15-inch full-page display is $1295; with a 14-inch half-page display the list price is $995. For more information, call MicroMac at 714/363-9915.

Opcode Goes Real-Time

Opcode Systems is going to publish Max, a graphical multimedia-development system that was developed in France at the computer music research institute IRCAM. Max provides developers with interface tools such as sliders, buttons, and menus, and it can process data in real time, making it well suited for use with video and MIDI. It will list for $395. For more information, contact Opcode at 415/369-8131.

The HyperCard Alias

Apple and newly reabsorbed Claris will both distribute HyperCard 2.0. Apple's version, bundled with every Mac, has the same features as the Claris version but includes abbreviated documentation for nonscripters. The $199 Claris version has complete documentation and access to telephone technical support. For more information, contact Claris at 408/987-7000.

Fruitbase for Macintosh

Mac newcomer Bananafish Software's ThoughtPattern is an unstructured database designed for managing diverse kinds of information. A ThoughtPattern database can store items such as dates, text, images, reminders, and pointers to other applications' files. When convenient, you can tack on tabs—descriptive text labels that you make up as you go, cross-index, and arrange in hierarchies—and then retrieve data with filters that combine text- and tab-searching. ThoughtPattern will probably list for $159. For more information, contact Bananafish Software at 415/929-8135.

VIDI's RenderMan

Visual Interactive Development is combining all of its applications into one integrated system called Presenter Professional. Its 3-D modeler's interface is vastly improved and resembles Adobe Illustrator, with bezier curve–like handles on 3-D splines and an interpreter that brings PostScript fonts into 3-D space. The Presenter module incorporates ray-tracing and shading, including a point-and-click interface for setting RenderMan shader parameters. The final module, Projector, shows rendered animations. Presenter Professional lists for $2200. For more information, contact VIDI at 818/918-8834.

Lapis Brings Out Display Boards for the New Macs

Lapis Technologies, maker of display adapters that link Macs to a wide variety of PC and Mac monitors, has begun shipping versions for the three low-cost systems. The DisplayServer Classic, DisplayServer LC, and DisplayServer IIsi are all monochrome display boards. The DisplayServer Classic uses a custom clip that attaches to the processor on the Classic system board. Lapis expects list prices on the boards to range from about $400 to $500. The company also said it hoped to begin shipping 8-bit ColorServer boards for the new machines by the end of 1990. For more information, contact Lapis at 415/748-1600. ■

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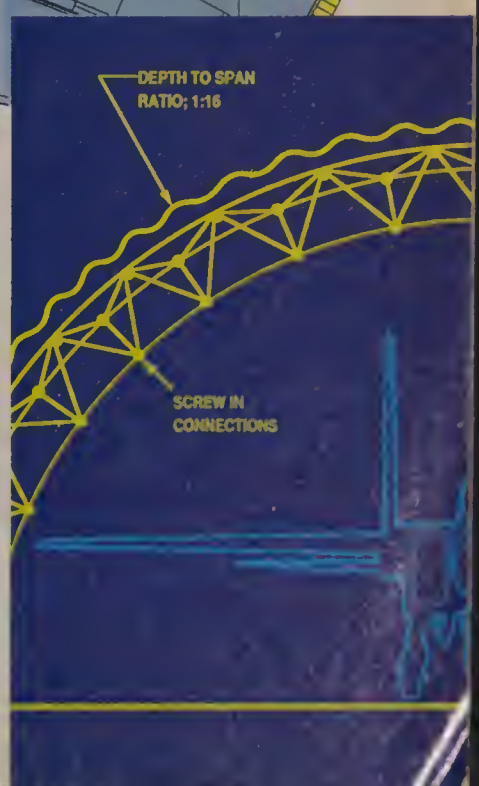

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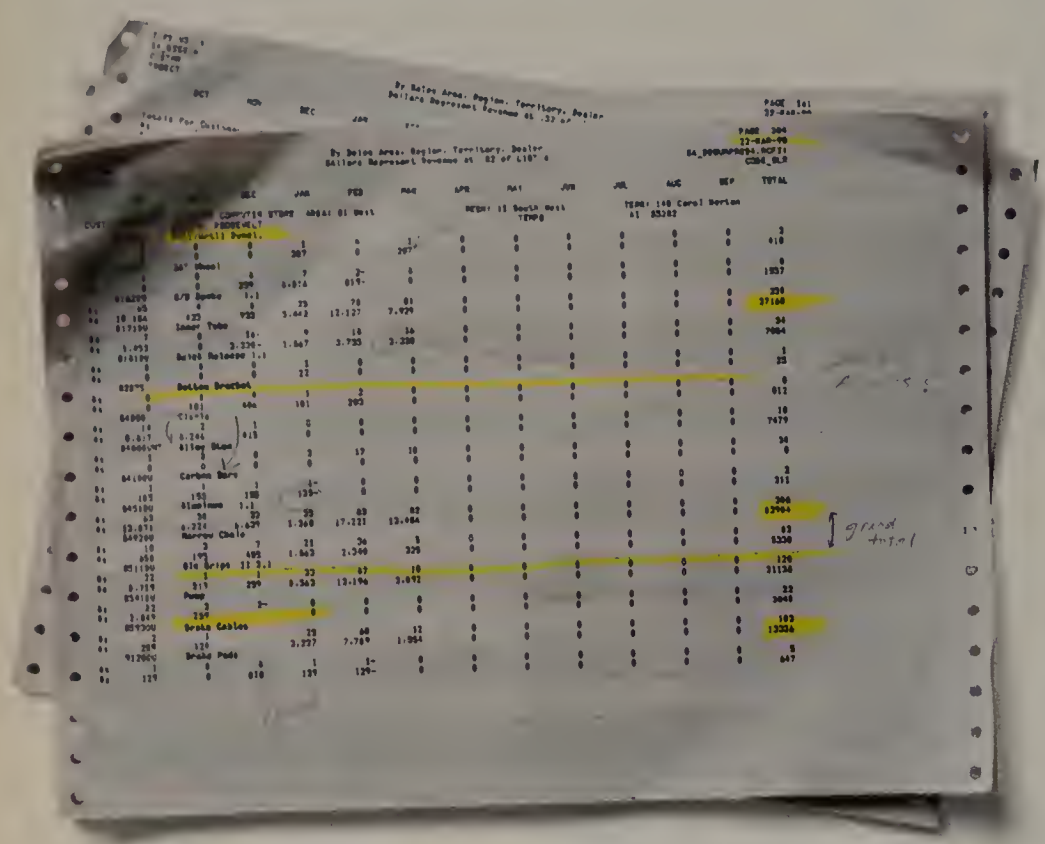
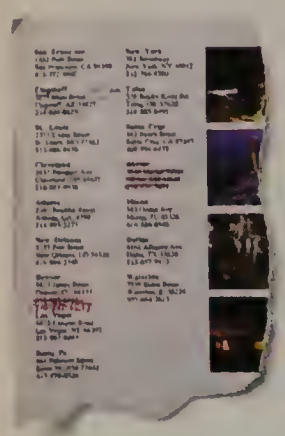
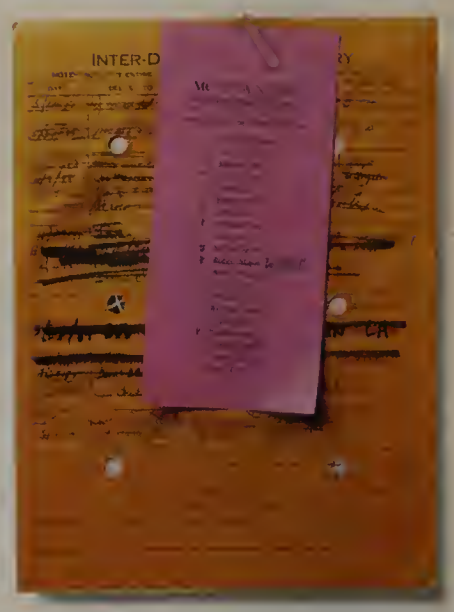
You can't always choose the data you have to manage.







But you can choose how to manage it.

Sometimes it seems our world is built on data.

Customer names. Stock codes. Discount levels. Sales dates.

Pieces of information we must somehow keep track of and do something with.

Which is why so many people are turning to FileMaker® Pro software.

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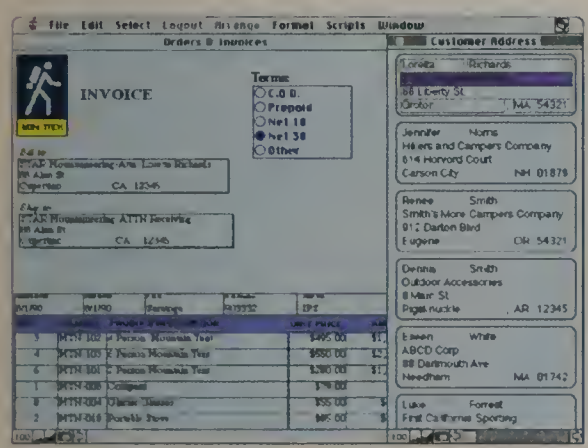
For example, you can automatically update mailing lists. Track sales any way you can think of. Share parts of your files on a network with some colleagues but not with others. And publish the results in full color.



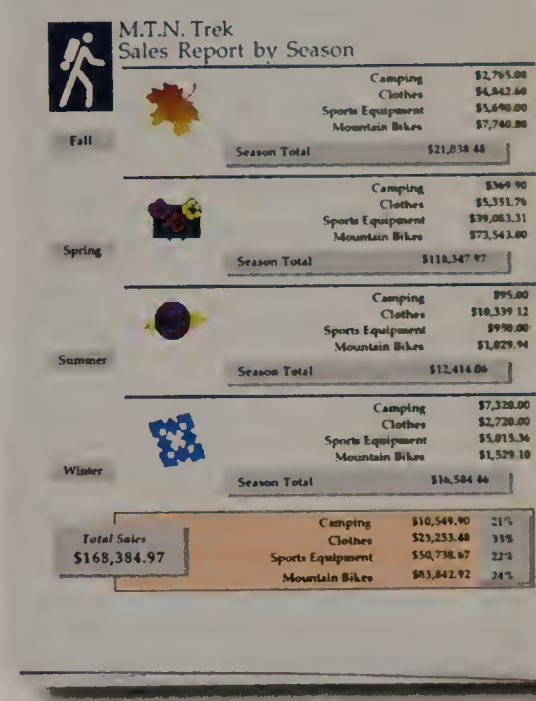
Multiple-file lookups let you relate data. For example, when you want your monthly invoices to each show customer address, FileMaker Pro looks at the customer name, searches the customer address file and fills in each address for you—all automatically.

FileMaker Pro lets you automate repetitive tasks with "buttons." It's easy. Simply select any object or graphic on the screen, and a button is born. Buttons can invoke commands, trigger scripts and switch layouts—all without plodding through a programming language.

Yet for all its power FileMaker Pro is remarkably simple to use.

You learn no programming language. And you can begin immediately; FileMaker Pro will show you how to get started right on the screen.

When using other software, FileMaker Pro lets you exchange words and graphics with your word processor, spreadsheet or drawing program, for example, all with the click of a mouse.



Your job demands information, not data. FileMaker Pro includes a range of calculation functions: It turns raw data into business information. And with MacDraw®-based tools built in, you can display this information on the page any way you want.

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FileMaker Pro.
The #1 database manager for the Macintosh.

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The Mac's Seventh Birthday

Why is this guy so cranky?

BY JERRY BORRELL

It was one of those long October nights. The sky had dimmed to purple and the lights along the San Francisco skyline glinted yellow and white across the freeway from our offices as designer Leslie Barton and I sat working on projects.

I was using designer Arne Hurty's Mac IIfx to work on the "Year in Review" article that you see in this issue. Arne's Mac uses a Radius QuickColor board, so it's pretty much the screaming machine in the department.

As I sat at the computer discovering new PageMaker features, I asked Leslie for help when I got stuck. Eventually I found myself asking out loud why PageMaker didn't do this or that. Why there was no alignment tool for geometric objects (I was placing boxes to represent where photographs would reside). Gawd. MacDraw had that years ago. I began asking why the display always had those irritating artifacts—those bits of type that don't seem to go away unless you do something to redraw the entire screen—that I first noticed in 1984 while using PageMaker 1.01. And for Pete's sake—why does the screen still take so long to redraw? And Leslie, isn't there some function that will enable me to nudge these boxes in one direction a pixel at a time like in QuarkXPress?

"Hah!" says Leslie. "Just wait till you try to print." At which point I looked covetously at one of the two top-of-the line IINTX printers in the art department and said, "Fast, huh?" "Not exactly," she replied. Some 25 minutes later my 8-page feature came whizzing out. "How do you stand this?" I asked. "Well, we learn to work in 200 percent mode and make our corrections on the screen." But doesn't that defeat the purpose of interactive design—you want to see proofs fast? "You get used to it," said Leslie. And, "Oh yeah. Most of us design on 13-inch screens."

So before long you know what we've got. We have your biannual column from yours truly in which I ask why the heck the Mac doesn't do all those things I want it to. Yep. The Christmas wish-list. The kind of column that endears me to Randy Battat, vice president of product marketing at Apple. Of course we've been real close ever since CBS wanted to know why the 13-inch Apple monitor had the highest emissions measured in *Macworld* tests. But Randy likes to hear from customers and we spend plenty on new Macs each year. So here goes.

The Wish List

I think CDs are neat. Associate editor Liza Weiman produced our first *Macworld* CD ROM this year and it demonstrates a lot of potential. But what I want is a cheap, small, highly reliable CD ROM player. After all, we can buy a Sony Discman from our local electronics merchants for slightly over $100. Every so often we cast a look at the loud, big, slow, and expensive Apple CD ROM player and wonder why it should cost so much.

Well, even as you read this someone at Apple is working with Sony to have the CD drive mechanism downsized. At the same time there is a possibility of improved access times and greater responsiveness overall for the drive. But as for pricing rivaling that of a consumer player, it's not in the cards. The difference in the two is in the nature of the devices.

The Apple CD is an industrial version of the consumer player—and has to be to stand up to the number of disc accesses and the type of disc accesses that we demand of it. Unlike with audio CD players, consumers with data CDs access data at random, demanding much more of the player's reading head and motor mechanism. The electromechanical mechanism in the consumer model just won't stand up to those kind of demands for long.

Still, given the ability of Japanese manufacturers to improve technology, I think a cheap and small player is a practical wish. I'll take small and faster as an interim offering, though.

I want a 19-inch LCD screen (with even better contrast than the Mac Portable screen's) that I can use as an option for my Mac. I'm prepared to

(continues)

put up with simulated gray scale and color in return for the benefits of having a smaller, emission-free device on my desktop.

The main thing I want is a screen I can have on my desk without cluttering the entire work surface. Like most people who use a Mac II, I have a computer work surface and a *real* work surface. But I want a nice-looking, unobtrusive high-tech flat panel sitting on my desk.

Longer cables and vertical machines would be nice. This is certainly low tech. How about a cable attaching my monitor to my CPU that would allow me to have them a few feet apart? Same deal with my floppy drive; I would like to have a flat panel and a floppy drive on my desk, with the CPU tucked away somewhere out of sight and earshot.

Of course it would be handy if I could stand the CPU on its side or hang it from the back of a desk, out of the way. But nooooooo. Someone had to make machines that have to sit flat. OK. At least the si and LC are smaller, but I still don't want them cluttering up my work space either.

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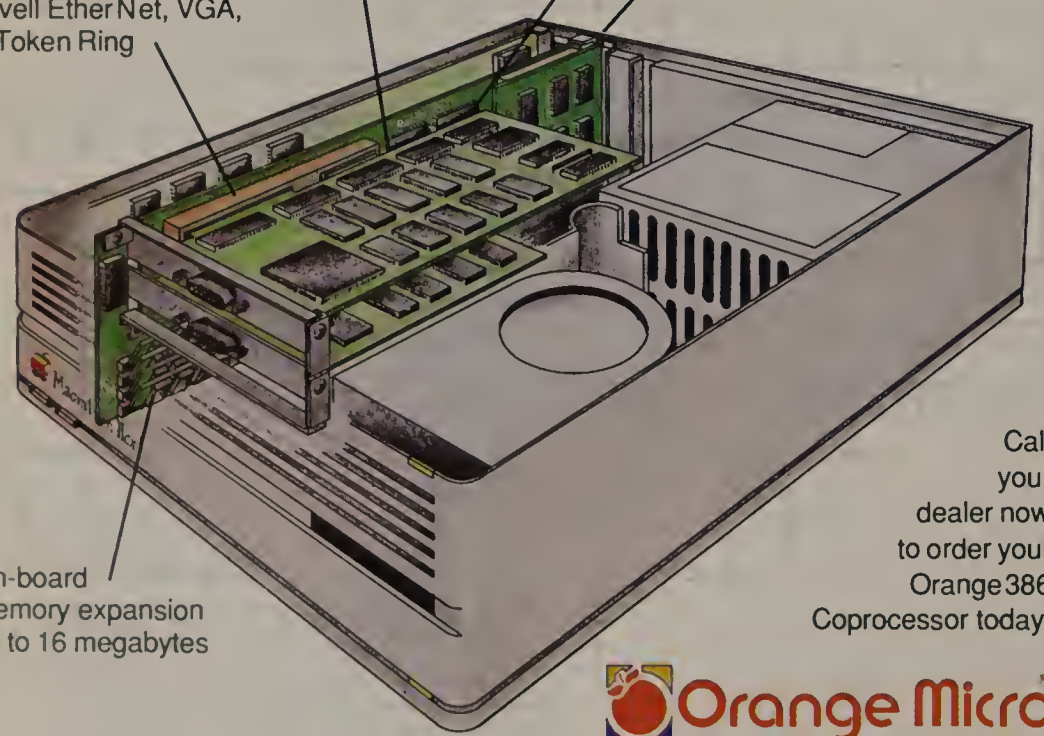

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Third Request

And while we're on the subject of connecting things to my Mac, where the heck is a 3½-inch optical drive? You remember, the one that connects via SCSI and has tiny compact discs that store about 125MB and slip easily into my briefcase. Right. That one.

It has a small drive mechanism that I can also slip into my briefcase and carry with me. There is simply no reason why we don't have this device available to replace external floppy drives. So many of us carry a hard drive around between home and office, or travel to a place where we have a Mac available. With 125MB per disc, we could actually carry around anything we might ever need.

It would be wonderful if Apple had a multiple storage option available to us in retail stores. You walk in and have the system of your choice configured for floppy, magnetic, CD ROM, or optical players inside your Mac. A neat idea—building machines that would allow us to reconfigure our machine for a storage option of our own choice. I know, I can hear groans from product marketing at Apple (who would have to explain the options) all the way up from the valley, calling me a dipstick and worse. Dealers with shelves full of too many product options already are canceling subscriptions to *Macworld*. There are lots of reasons to limit the options. And only one reason to do something like this—to give your customers a choice.

I Dream of Genie

In my quiet moments of using the alpha version of System 7.0 I have come to realize that one of the most rewarding aspects of using a Mac is the Finder, the desktop aspect of the interface. 7.0 has a lot of neat features. It has better hierarchical features for

(continues)

Survival of the fittest.

Which color scanner is the natural selection?

Microtek Scan Original: 8 x 10 B&W print
Brightness level: n/a Input resolution: 150 dpi
File Size: 486K Output Resolution: 300 dpi
Line Screen: 133 lpi Gamma Correction: None

When it comes to selecting the right scanner, be forewarned. It's a jungle out there. You may not get the quality you were promised.

The La Cie Silverscanner has evolved beyond all that. Just look at this comparison between the Microtek 300ZS and the La Cie Silverscanner. Each image was scanned at standard settings with no corrections. This ad was then created and separated using Adobe Photoshop, QuarkXPress and a Linotronic 330.

As you can see, Silverscanner is a more advanced species of scanner which adapts better to a changing environment.

Silverscanner provides superior color, gray scale and line art over any other similar species of scanner. And as a bonus, Adobe Photoshop Limited Edition, Aldus PrePrint, Silverscan and Silverlining are included FREE with every Silverscanner purchase.

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LaCie Scan Original: 8 x 10 B&W print
Brightness level: 2 Input resolution: 150 dpi
File Size: 484K Output Resolution: 300 dpi
Line Screen: 133 lpi Gamma Correction: None

Microtek Scan Original: 8 x 10 color print
Brightness level: n/a Input resolution: 150 dpi
File Size: 1,506K Output Resolution: 300 dpi
Line Screen: 158lpi Color Correction: None

La Cie Silverscanner: 16 million beautiful colors, 256 smooth shades of gray, incredible line art, up to 600 dpi all in a single pass.

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folders and volumes. The pull-down menus are better organized. Cleanup is more functional. Applications are more convenient. Lots of stuff.

Well, it should be better. (I hear more groans coming from Cupertino.) I don't want to have the ability to customize it—I remember what havoc I wreaked with Kolor, the DA that allowed me to create a gawd-awful desktop—I'd rather that the human interface group and system software guys made the choices for me. But it's been too long since I was blown away. It's time that the Mac interface amazed and amused once more; did stuff that makes me repeat the same operation over again just to see it happen. Remember when documents used to redraw onto the screen from the folder when you opened it? That little zooming effect? Remember that for quite a while you never tired of seeing that because it was neat?

For example . . . (Roger Heinen, Apple vice president of software, is putting this column on a bulletin board and throwing stuff at it. Inviting people to write suitable captions. Rolling his eyes heavenward.) For example: when Apple announces its video-capture board, it should announce a DA that will enable me to capture a picture of my favorite movie star, record the star's voice, and then have that little recorded agent replace my start-up sound, deliver my AppleLinks and E-mail to me, keep me up-to-date with what I'm doing that's dumb. ("Jerry," says my personal agent, "you should allow me to shut down the extraneous windows on your screen so that you'll get better performance with your applications.") What the heck, as long as I'm anthropomorphizing, my digitized agent—say, Opus from Bloom County—will make regular appearances reminding me that the printer is out of paper, that I have E-mail, and so on.

Horsepower

Silicon Valley is full of young men driving 4-wheel-drive Porsches, Acura NSXs, BMW 735i's. The kind of guys that want to have the biggest, fastest whatever it is. There is also a crowd of us that sublimate our car fantasies with a computer, or at least like to think that the machine we're using is a real hot rod. And there are a lot of real users like Leslie and Arne who have to get a job done on their computers. All of us are wondering where the hot-rod machine is. Really. When the IIfx bogs down on redrawing FreeHand illustrations even with an accelerator, or in redrawing PageMaker files—everyday applications—what we have is a horsepower shortage.

Maybe it's got a Motorola 68040 accelerator, maybe an AMD Am29000 graphics coprocessor, maybe transputer or RISC coprocessors. I don't know what it will take. Ask Eric Harslem, Apple's VP of hardware engineering. He knows. Ask the old-time engineers like Jack McHenry who have been building the latest machine for

(continues)

Clogged serial ports?

With the proliferation of popular serial devices-printers, scanners, digitizers, plotters, modems, graphics tablets and the like, comes the need to control several serial ports simultaneously.

QuadraLink™ is the answer to clogged serial ports. QuadraLink plugs into any Mac II series expansion slot and provides four additional serial ports.

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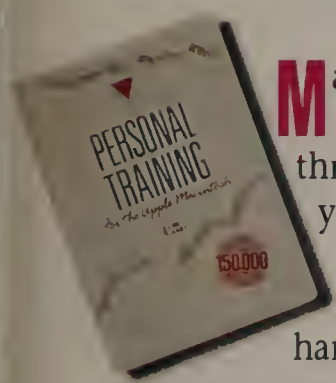

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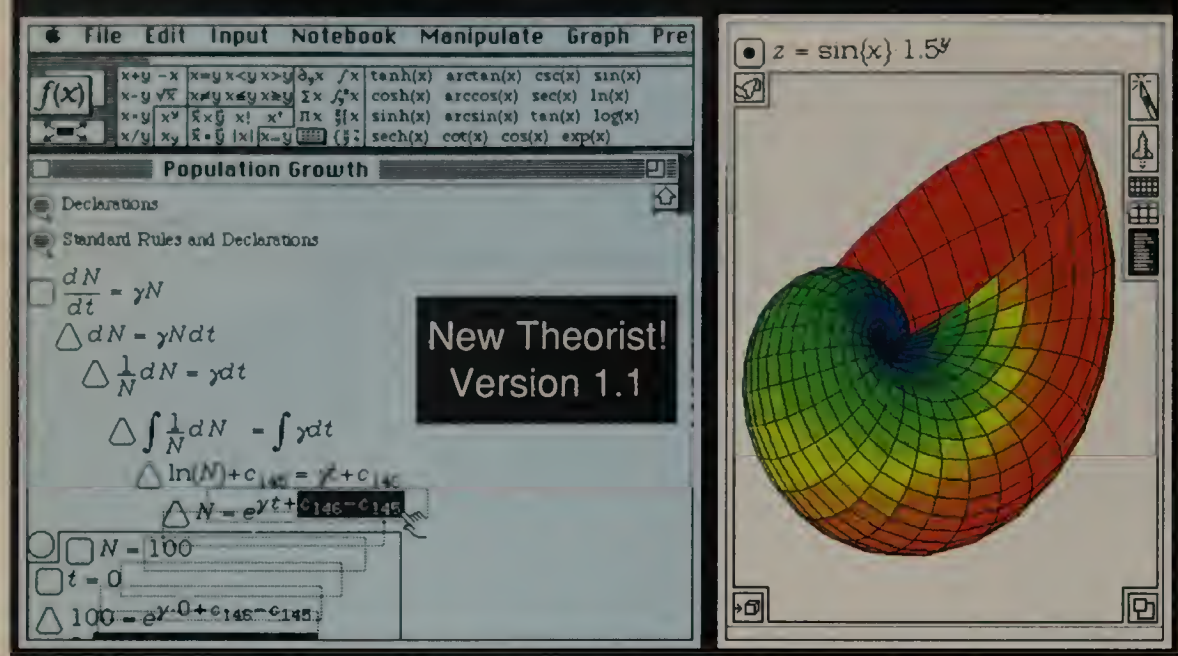

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almost a decade. The Chuck Yeagers of the personal computer world. (A Motorola 68040? Or something else?)

Of course, I'm probably unhappy because I'm working on a Mac IIcx. A machine that makes my system go away whenever I print a draft. Whatever happened to the concept of background operations under MultiFinder? Did I miss that?

I have a RasterOps 364 board connected to an Apple 13-inch monitor, in addition to a 19-inch SuperMac monitor attached to a SuperMac 8-bit board. Every time I touch my keyboard, "Save the Planet" (the PBS series) playing on the Apple monitor (thanks to the 364) freezes or develops a little glitch. Hey—this machine should have enough power to do both at once. This machine should have enough horsepower to regularly pick up and print my messages without disturbing me (don't make me open up QuickMail or AppleLink—just do that for me without messing with my screen). Yo—wicked fast machine my ass. I'll let you know when you produce a machine that's wicked and fast. That's when *I'm* blown away, not someone in product marketing. I don't even want to see the benchmarks. I just want to scream through my applications work and have background and housekeeping done without being bothered.

Real-Time Multiprocessing

Or whatever nomenclature you want to use for having a computer do several things at once. I don't use a Sun Microsystems SPARC machine. I don't program. So I don't need to run a compile operation in the background while I keep coding—real engineers need that kind of horsepower. But I can multiprocess, and I would like my computer to keep up with me. I'm not even including the so-called background tasks from the previous paragraph. I want to have my main application open, MacWrite, Excel, Illustrator, whatever. And I want my little video window up in one corner. The computer would read the subtitling on the broadcast signal and turn on the sound whenever the titling has a keyword, say, Apple Computer, that I want to hear about. I want to have

(continues)

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one window open that informs me about network status, and that makes a recommendation about what printer on our network I should use at a given time (this implies a more facile and subtle Chooser). It's also backing up my work to our central server so that when the system crashes I'm safe. Another window would have my calendar of events open with a timer —because I don't want Opus telling me about the entire day. He's just a reminder. And another window open on an application that I'm working on in my spare time, or as a thought is conjured up. All of this would be live, not sitting in the background waiting for the CPU's attention.

If my computer is really going to be a productivity tool, then it is going to have to do a lot more for me than the current single-dimension paradigm. It needs multiapplication processing.

Real Standards

This wish is short and sweet (but not easy)—text and graphics formats should be universal across all Macs and all Mac applications. This wish is like wanting peace for mankind. Maybe we could gather a bunch of Mac stars and make a recording. We could get Bill Atkinson, Bruce Leak, Dave Fung, Mark Cutter, Tony Leung, Andy Hertzfeld, and Keith McGreggor together in a studio and have them record a song about how they want type and graphics to be editable on all Macintoshes in all applications. Do a video and release it in time for the January Macworld Expo.

The Missing Macs

My Santa Claus overload alarm warns me that I've run out of wish space, but I would like one last thing. A new portable. Either a very tiny one that sacrifices the keyboard and looks like the Sony Discman or a smaller version of my current portable. One that won't make it necessary to check a suitcase when I travel.

What's Not Missing

Cellular Macs. Let's wait for cellular phones to work before we make the Mac cellular. One more irritating call from a static-filled cellular phone line and I'll *really* get cranky. ◻

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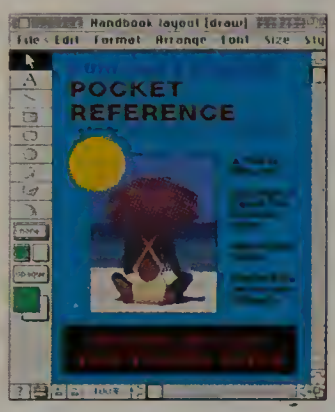

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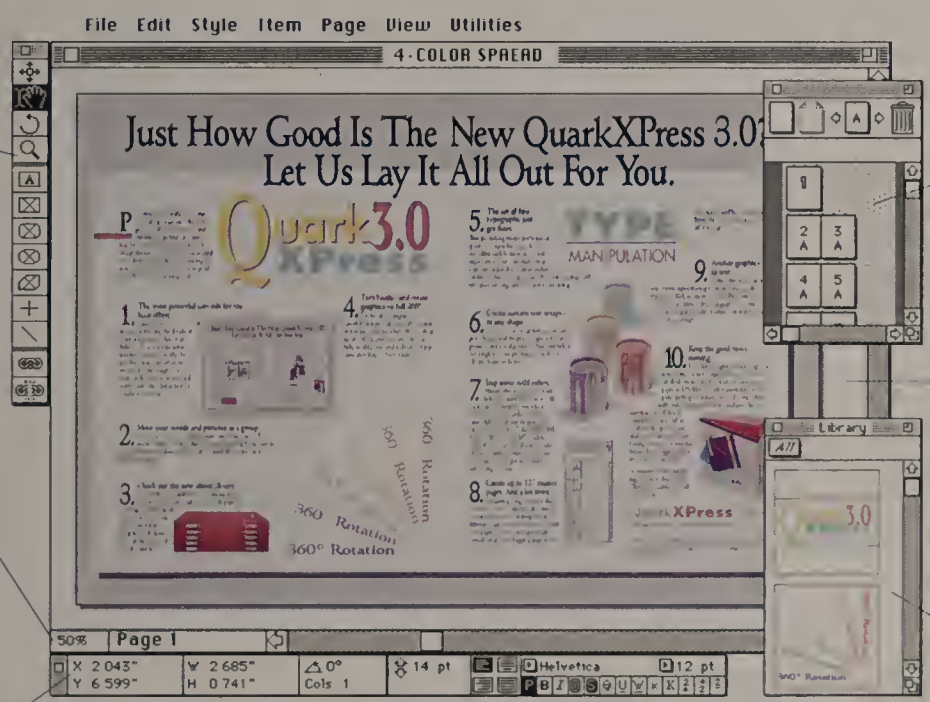


Creating multiple-page documents is easy with a new palette that enables you to insert, delete, and move pages graphically by dragging page icons.

A pasteboard lets you position pictures and text off the page, create bleeds, and design multipage spreads up to 48" × 48".

Library palettes provide an easy way to store text and graphics. You can copy and paste or drag items from an open library onto a page and between open libraries.

QuarkXPress

The Choice for Publishing Software Worldwide

Visit your local dealer and experience the power, precision, and ease of QuarkXPress for yourself.

Circle 295 on reader service card

INTROD
THE 1991 TA

Until you [illegible] additional problem and [illegible].

You'd either pay someone lots of money to do your taxes. Or suffer through doing your taxes yourself, and end up wishing you'd paid someone to do them.

Introducing the third and better option.

TurboTax! The tax preparation software designed for your Macintosh, that's like having someone to help you, and hold your hand while you prepare your own taxes.

While it knows all the tricks of an accountant, it incorporates the care that only you can have for your hard-earned money.

It guides you through preparing a tax return step by step. More than 60 commonly used forms, schedules and worksheets are included.

If you run into tough tax terminology, TurboTax will use a hypertext format to translate it into easy English.

It lets you try various tax scenarios to maximize your refund. Declare a stock loss, for example. Depreciate income property. Or try a different W4 deduction for next year's return.

TurboTax guides you in categorizing and filing more than 90 types of expenses and income. Then proofs your return in over 250 areas to help ensure no mistakes in logic, calculation, or any missed savings opportunities slip through.

It'll even help you sleep at night.

UCING
X REFORM.

Tables showing the percentage of the returns audited for the amounts you're claiming can be used as a safety check. So there's little worry that anything on your return might flag the IRS.

All the number crunching is done in under 5 seconds. Then, when you're finished, you can print out and mail in your return right off your computer.

When you spend about $89 for our program, you're part of a program. Because TurboTax is offered to you every year after at half price.

If you would like to try our award-winning tax preparation software, drop by your software store, or call us at (800) 745-8829

Ask about the whole family of ChipSoft products, including our 10 interfaceable State Programs and an Electronic Filing Option.

You'll find out why over 3 million returns were prepared with TurboTax last year alone. Or, for that matter, why more PC users use TurboTax than any other tax software.

Circle 147 on reader service card

Now TurboTax has come to the Macintosh.

And, for even more people, thankfully, taxes will never be the same again.

Special Offer For Macintosh Turbo Pascal® Owners!

You Can't Create Today's Programs With Yesterday's Pascal.

Upgrade From Turbo Pascal To THINK Pascal™ For Only $99.

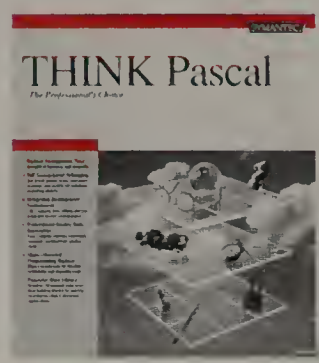
If you want to write Pascal programs that take advantage of Apple's latest hardware and software, or give object-oriented programming a try, you'll never be able to do it with Turbo Pascal. Because according to Borland (on CompuServe), Turbo will never be upgraded again.

That's why until February 28th, 1991 we'll upgrade you from any Macintosh Turbo Pascal to THINK Pascal for only $99. A savings of 60% off our regular $249.

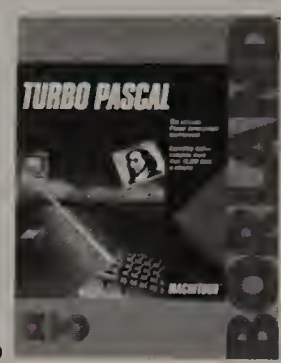
The #1 Pascal On The Mac.

Just call Symantec at (800) 228-4122 Ext. 802 and have your copy of Turbo Pascal handy. We'll send you THINK Pascal, the fastest Pascal on the Mac.

THINK Pascal saves you time with a text editor that formats code automatically as you type it in. Its source level debugger makes finding bugs quick and easy. And because it can compile up to 44,000 lines per minute and link any file in under 2 seconds, you can see the results of your programming as you program. All of which makes THINK Pascal the fastest way to finished software. And the #1 Pascal on the Mac.



VS.



	THINK PASCAL	TURBO PASCAL
MultiFinder Compatible	YES	NO
Latest Apple Software Support	YES	NO
Latest Apple Hardware Support	YES	NO
Instantaneous Linking	YES	NO
Source-Level Debugging	YES	NO
Pretty-Printing Text Editor	YES	NO
Object Pascal Support	YES	NO
Class Library Included	YES	NO
Class Browser	YES	NO
On-Line Tutorial Available	YES	NO
Automatic MAKE facility	YES	NO
Apple's MPW Source Compatible	YES	NO
Supports 68881/68882 FPU	YES	NO
Committed To System 7.0	YES	NO

The Pascal Of The Future, Today.

Unlike other companies, we're committed to Macintosh programmers. We offer frequent upgrades, and even now, are working closely with Apple so that when System 7.0 arrives, you'll have programming tools to take advantage of it.

We give you unlimited free telephone support, ideas and help on CompuServe and AppleLink, even a dedicated user group: SPLAsh-Symantec Programming Languages Association.

And if that's not enough, we'll even teach you how to program with *Just Enough Pascal*, our optional interactive training software that steps you through the basics of Pascal while you create a real, working game.

So pick up the phone and give us a call. But hurry. Because on March 1, our $99 offer on the Pascal of the future is history.

Trade Up Today, Only $99. Call (800) 228-4122 Ext. 802G For More Information

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Circle 215 on reader service card

LETTERS

Long-Distance Typing

Are computer keyboards hazardous? It's obvious to any of us who suffer with repetitive strain injuries, cumulative trauma disorders, or carpal tunnel syndrome. However, your column decrying the lack of ergonomic keyboards ("The Keyboard Conundrum," *Conspicuous Consumer*, October 1990) missed an opportunity to lay much of the blame for this squarely on the shoulders of the real culprit—the antiquated QWERTY key configuration.

It's an outmoded layout that forces us to reach all over the keyboard to type the most common words. One study has shown that the hands of QWERTY typists travel between 12 and 16 miles in the course of a day of typing. And yes, it hurts.

I switched to Dvorak after spending several weeks with my wrist in a brace, ingesting antiinflammatory drugs, and avoiding the computer whenever possible (not an easy task for a copywriter/graphic designer). I've since been able to taper off the drugs and abandon my brace.

How can you make the switch? Paragon Concepts (800/922-2993) offers MacQwerty, which can run as a desk accesory and comes with plastic overlays for the keys so others who haven't made the switch can still use your Macintosh. If you want a typing tutor to boost your speed, Mavis Beacon Teaches Typing enables you to select the Dvorak configuration for your lessons.

SCOTT BALDWIN

We need ergonomic solutions, but we also need to make intelligent decisions about keyboard configurations. The QWERTY standard is a dinosaur; it's time to bury it.

Gloria Alvarez
New Orleans, Louisiana

Protect Yourself

I have been using computers since 1982 and have always been careful when designing my workstation. I had a hydraulic adjustable chair with excellent lumbar support, a low worktable just for my computer, good lighting, a tilting screen, everything I could ever need to be comfortable at work.

In November 1989 I developed sharp pains in my right wrist and was diagnosed with ulnar nerve entrapment. Everything in my life became difficult: driving, gardening, housework, holding anything in my hands for any length of time, playing the piano. I am in constant pain. I had group long-term disability insurance (LTD) through my employer that should have entitled me to 60 percent of my salary until I turned 65.

In February my company was hostilely taken over, and as a result, I was terminated and my group disability insurance was canceled in May. I immediately contacted my broker to obtain my own LTD policy with the same carrier that handled my group insurance. The new policy, which was not written until July, excludes any disability caused by injury relating to ulnar nerve entrapment or injury to either wrist. Even though it had insured me at the time of the injury, the insurance company has deemed my wrist problem to be a preexisting condition. The lapse in coverage occurred only because the carrier took so long to complete its underwriting.

This July I experienced the same symptoms in my left wrist. If I am disabled as a result of this injury, my LTD policy will not pay any

(continues)

Corrections

Delphi's E-mail system allows file transfers; the footnote for Prodigy's electronic banking feature should have read extra cost *(not $160 yearly); America Online has 38 Mac companies online ("Online Features Compared" table, "Life Online," September 1990).*

Illustrator 3.0 (not 2.0) was the version that should have been listed in "Product Watch" (Best-Sellers, *October 1990).*

PageMaker 4.0 is a major upgrade—$795; $150 for registered users (Updates, *November 1990). New features include a story editor, index and table-of-contents generation, a spelling checker, and a search-and-replace function.*

Accolade's Balance of the Planet game (Reviews, *November 1990) is a stand-*

(continues)

alone application, not a HyperCard stack.

Because Apple announced the Macintosh Classic, the LC, and the IIsi on October 15, 1990, we were unable to cover them in the November issue sent to subscribers. We delayed distribution of newsstand copies until after the embargo date so we could include an insert on the new Macs (complete text of that preview is in the Macworld forum on America Online). In-depth articles on all the new machines appeared in the December issue. There were two errors in the November insert: Screen resolution for several Mac models should have read 512 by 342, not 512 by 384. Our tests showed the IIsi to be faster overall than the IIcx.

benefits. I will probably be able to collect state short-term disability, Social Security, and maybe workers' compensation—but only if I'm unable to work in any capacity.

If you have company insurance, you could lose any right to benefits due to your termination, cancellation of the group, or a change in carrier. So here's some advice for your readers: Get your own long-term disability insurance; it's the only way to protect yourself if you do become disabled.

Leslie D. McLean
Floral Park, New York

A Step Forward for EMF Research

Thank you for your commentary on electric and magnetic-field emissions. I found it very illuminating. However, there is one clarification I would like to make: My congressional activity on this issue involved authorization and appropriations to the Environmental Protection Agency, not to the Department of Energy. I support the ongoing research at DOE, but I also believe that the EPA should be playing a role in EMF research. Therefore, earlier this year I introduced an amendment to the EPA research and development authorization bill that authorized the EPA to conduct research on EMF. The amendment was adopted by the House Science Committee but the bill has yet to be sent to the floor for a vote.

I wanted to be sure that the EPA could begin EMF research in Fiscal Year 1991; therefore, in June I entered into a colloquy with Representative [Bob] Traxler, the chairman of the VA, HUD, and Independent Agencies Subcommittee, to request that $1 million be appropriated to the EPA for EMF research.

I am pleased to report that the subcommittee's final conference report for Fiscal Year 91 includes $750,000 to the EPA for EMF research. This is a step in the right direction, and I expect that this issue will receive greater attention in the next Congress.

George E. Brown, Jr.
Member of Congress of the United States
House of Representatives
Washington, D.C.

Science and the Mac

I teach molecular biology in our M.S. and Ph.D.

You could have the pleasure of mixing and matching software for your new Mac.

programs and have been waiting for the appearance of decent molecular software for the Mac. Therefore, I read with great interest Charles Seiter's review of Alchemy II 1.01 (October 1990). Has the time finally arrived when we can do on the Mac (perhaps with a friendlier interface) the things we always wanted to do on a workstation we did not have?

Modern genetics is an area in which computing is playing an essential role in advancing the state of the art. As molecular biologists worldwide gather genetic information faster and faster with advanced technology, more-powerful software and hardware are demanded for the storage, communication, analysis, and interpretation of information. For this kind of work, the most popular platforms so far have been the IBM PC and the VAX. We have tried DNA Inspector II and MacMolly on the Mac without satisfaction. Now a few new gene/protein-analysis systems for the Mac are appearing on the scene. We are currently testing GeneWorks from IntelliGenetics. It would be nice if software in these important areas could get more attention.

Carton W. Chen
Institute of Genetics
National Yang-Ming
Medical College
Shih-Pai, Taipei, Taiwan

Design Gone Awry

Let us pray that Mitch Kapor's conference on software design doesn't become "an event as significant . . . as the birth of the Bauhaus" (*The Iconoclast*, October 1990).

The Bauhaus stands for much of what is wrong with modern design. Its original premise of "form follows function" immediately became corrupted into "form follows the personal whims of a few self-appointed, self-anointed saints who know what's good for the rest of the world."

As a graphic and industrial designer, I shudder to think of the software equivalent of the Seagram's Building.

J. C. Bourque
Miami Lakes, Florida

PageMaker's File Recovery

In response to Jim Heid's otherwise accurate and thorough review of Aldus PageMaker 4.0 [*Reviews*, September 1990], I have to point out a misconception about PageMaker's ability to recover temporary files.

PageMaker performs an automatic minisave at various times, including every time you turn, insert, or delete a page; edit styles; print; or change page setup. Therefore, when a temporary file needs to be recovered, PageMaker can always recover the data back to the last minisave.

Mark Craemer
Aldus Corporation
Seattle, Washington

The Truth about Egghead

All of us at Egghead appreciate the observations about our stores and service in your September 1990 *Commentary*. However, we'd like to clear up any misconceptions customers might have about our stores.

(continues)

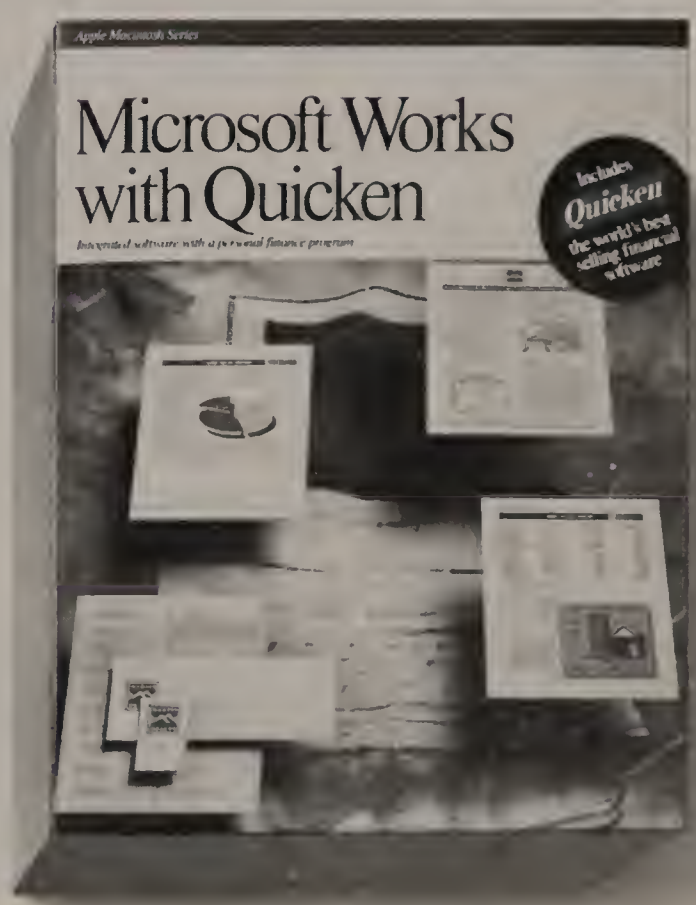
Or leave it to us.

Why put yourself through all of that when all you really need is this.

We've packaged Microsoft® Works with Quicken® in order to give you six powerful tools in one simple box. A word processing module. A spreadsheet module. One for databases. Communications. And personal/small business finances.

Everything you need to get down to business on your Mac®. Quickly and easily.

See your dealer before December 31st. And find out how buying this special package can save you money. Not to mention all those endless hours of frustration.



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All of our stores are company owned, not franchises as the commentary stated. And we indeed sell only software and related accessories. One of our San Francisco stores may have appeared to be selling personal computers, but we also sell operating systems and demo them on our in-store PCs, and that's where a misunderstanding may have arisen.

John Kist
Egghead Discount Software
Issaquah, Washington

Fewer Ads, Less Competition

Those of us who started with the Mac in 1982 can remember when *Macworld* was very thin because of the newness of this marvelous machine. We all remember casting longing looks at the PC magazines, which featured relatively large selections of software and hardware at discount prices. Edward Arnold's complaint about the amount of advertising in *Macworld* [*Letters*, August 1990] only proves that the Mac community has come a long way and that superior software and hardware is so readily available that we take it for granted.

As an American abroad, I positively drool over the prices and availability of products advertised in *Macworld*—a result of the intense competition not present over here. Advertising, like that offered by MacConnection, keeps the cost of *Macworld* down. And magazines like *Macworld* keep me informed of the explosive growth in the Mac market. The articles, product announcements, tests, opinions, and the ads all provide a much-needed boost in my own understanding of all the available options.

I have seen *Macworld* grow through the years as an informative, easy-to-understand source on the exciting changes taking place in the Macintosh and hope that it continues to represent all aspects of that machine for many years to come.

Mark Hamilton
Wiesbaden-Erbenheim
Germany

On-Command

Your review of our wireless remote control On-Command [October 1990] contained several errors. The reviewer claimed that (1) On-Command would not let you select menu items, (2) it stops working if you quit the program in which you began your presentation, and (3) On-Command's use of the modem port renders it incompatible with MIDI and telecommunications programs.

On-Command lets you click and drag to make pull-down-menu selections. One On-Command key set can be used for any number of applications running at the same time under MultiFinder. On-Command can run on either the modem or the printer port. It has been tested in several MIDI environments and was found to be MIDI-compatible.

Jason Borovick
Computer Support Corporation
Dallas, Texas
(continues)

Circle 132 on reader service card.

Someone Has Some Explaining To Do.

The Mirror Trinitron uses Sony's patented Trinitron tube for the sharpest color image available.

The Mirror Trinitron comes with an 8-Bit Interface (MacII or SE30) that delivers 256 vivid colors, and software enhancements like Pop-up Menus, Enlarged Cursor and Menubar options, Screen Saver, and Screen Copy.

The Mirror Trinitron is available direct from the manufacturer without any Rep commissions or Dealer mark-up.

The Radius Trinitron uses Sony's patented Trinitron tube for the sharpest color image available.

The Radius Trinitron comes with an 8-Bit Interface (MacII only) that delivers 256 vivid colors, and software enhancements like Tear-off Menus, Enlarged Cursor and Menubar options, Screen Saver, and Screen Copy.

The Radius Trinitron is only available through authorized Radius Dealers.

There Had Better Be A Good Reason To Pay 47% More!

We've long admired the Radius Trinitron Color Display. That's why when we designed our first color display system, we chose to include many of the same concepts. Such as Sony's patented Trinitron tube which is now the defacto standard for the Macintosh. And an 8-Bit Video Interface that delivers 256 colors. And software enhancements like Enlarged Cursor, Enlarged Menubar, Screen Saver, and Screen Copy. And a built-in tilt and swivel base.

So Where's The Difference?

The fact is, in deference to Radius, we've had a much longer time to design a color display. That's why we've been able to build in some important differences. Here are just three:

1. Our ProView Interface delivers 256 color at 72dpi for true WYSIWYG scale so that the image on screen is the same as what you'll get from your printer.

2. Our Pop-up Menu feature is the next logical upgrade to Tear-off Menus, and our Stroke feature saves you both mouse and keyboard time.

3. **FREE!** We are including VideoPaint from Olduvai for a limited time at no charge! VideoPaint is the professional color painting and retouching application that was rated 5 mice by MacUser France.

The Big Difference: You Pay 47% Less When You Purchase Factory-Direct

Why pay all of the additional marketing expenses plus the dealer's profit? We've made installing and using the ProView Trinitron so easy that there's no reason to pay a dealer's 40% margin. Technical support is only a phone call away. (And who better to ask about a product than it's maker!)

Compare For Yourself!

	Radius	Mirror
20" Trinitron	Yes	Yes
8 Bit/256 Colors	Yes	Yes
WYSIWYG scale	No	Yes
Pop-up Menus	No	Yes
Tear-off Menus	Yes	No
Enlarged Cursor Option	Yes	Yes
Enlarged Menubar Option	Yes	Yes
Screen Saver	Yes	Yes
Screen Copy	Yes	Yes
VideoPaint ($495 value)	No	Yes
Dealer Markup	Yes	No
LIST PRICE	**$5690**	**$2997**

"Try one for 30 days, if you don't love it... I want it back.

Ronald Eibensteiner, President/CEO

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Circle 363 on reader service card

W16b

On-Command can work among multiple applications—but only under MultiFinder. This fact is not mentioned anywhere in the manual. On-Command crashed two out of the three MIDI programs we tested, Performer and Finale.—Ed.

CA Keeps Cricket Draw

In your November 1990 *Commentary*, you incorrectly reported that CA-Cricket Draw is no longer being marketed by Computer Associates. In fact, Computer Associates is both marketing and further developing the CA-Cricket Draw, CA-Cricket Graph, and CA-Cricket Presents product line it acquired from Cricket Software in July 1989.

Preferred Publishing of Memphis, Tennessee, owns the marketing rights to Cricket Paint and Cricket ColorPaint.

Kristin Keyes
Computer Associates
San Jose, California

High-Tech Education

I want to let you know what a service your magazine provides for an educator. My job is teaching computer arts and sciences to high school and college students.

Do you have any idea how much a science teacher can enhance a lesson with audio/video software and a Mac? One of my biology teachers had his students observing amoebas through microscopes. He then aimed a black-and-white TV camera down the barrel of the microscope and captured the image with ComputerEyes. Next he printed it on an ImageWriter and had enough copies made for the entire class to put in their notebooks so they could take it home and label the parts while the real thing was still fresh in their minds. The physics teacher uses MacRecorder to explain the principles of digital sound. This inexpensive accessory connected to a Mac and projected with an LCD panel brings sound to life. A cut here and a paste there, and voila! They understand how modern recordings are produced, as well as how information is transmitted through wires and space.

So while your magazine's main thrust is toward the heavy spenders of business and industry, you still haven't forgotten the people with black-and-white Macs. And congratulations are in order for the pressure you have put on vendors to back their products with warranties and customer service. I never thought I'd see the day when a vendor would have an 800 number for customer service instead of just sales.

John Occhuizzo
Norwin School District
University of Pittsburgh
Pittsburgh, Pennsylvania

In Defense of CrystalPrint

I would like to challenge certain portions of Jim Heid's article, "Page Printers Revisited" [October 1990].

Heid refers to our "skimpy 100-sheet tray." The CrystalPrint Publisher and Publisher II have been designed for the personal page printer market, which is characterized by a single user

(continues)

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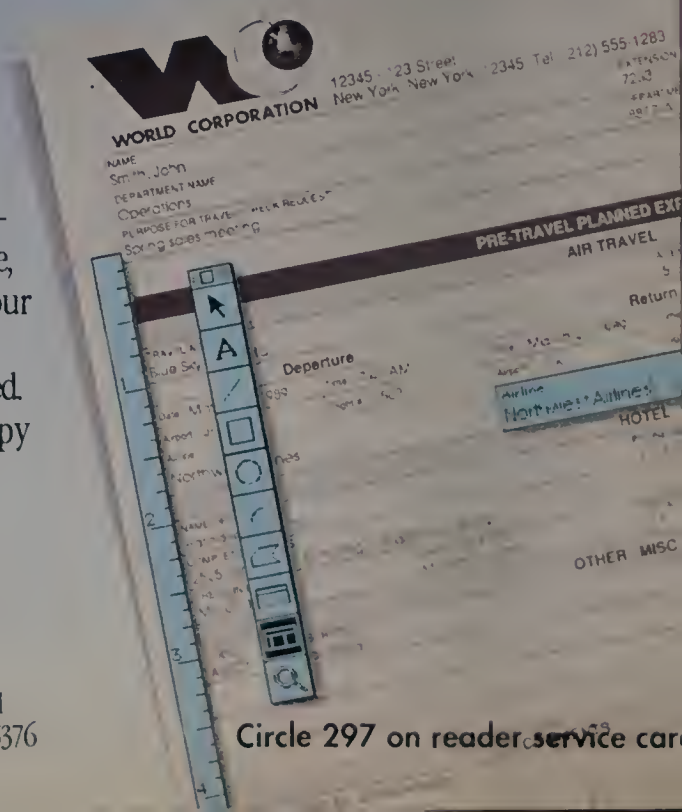

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INCLUDING INTERFACE AND SOFTWARE

MIRROR
$897
INCLUDING INTERFACE AND SOFTWARE

You Can Have Fun. Or Get It Done.

The Radius Pivot is a beautifully tooled piece of equipment. It's sexy in design. And it's fun to play with...twisting the screen into a portrait or landscape orientation. But ask yourself, are you buying it for fashion or for productivity? If it's productivity, you owe it to yourself to compare the Pivot to our PixelView II display. Let's compare:

Which Gives You Extra Viewing Area?

The Pivot's 15" monitor has 30% less screen than our PixelView II 19" display. You pay $18 per sq. in. of viewing area with Radius compared to $6 with PixelView II.

Which Gives You WYSIWYG Scaling?

The PixelView II maintains true WYSIWYG scale so that what you see on screen is what you see on the printed page. Everything is shrunk down on the Pivot's 15" screen.

Which Saves You Desk Space?

One of the benefits of the Radius Pivot is that it's supposed to take less desk space. But the Pivot actually takes more space than our 19" PixelView II monitor just to pivot. 20" to be exact. And forget about leaning anything up against it.

Which Works With A Macintosh Plus, SE, SE30 or II?

Our PixelView II works with the Macintosh Plus, SE, SE30, and any Macintosh II. The Pivot does too, but the pivot feature (that you pay so dearly for), doesn't work on the Macintosh Plus or SE.

Which Saves You 47%?

Unlike Radius, you can purchase your PixelView display system direct from the factory. That means savings. No middleman. No retail mark-up. That's why you pay 47% less for our PixelView II.

Now You Have A Lot Of Good Reasons To Pay Less!

Let's face it, you buy a large screen display to improve your productivity. A quick comparison will reveal that our PixelView display offers more productivity for your money.

$567
INCLUDING INTERFACE AND SOFTWARE

If Budget Or Deskspace Are Really Tight...

Our PixelView I 15" portrait display was designed to take a minimum amount of deskspace, while giving you a full page on screen. And of course it works with any Macintosh Plus, SE, SE30, or II.

Compare For Yourself!

	Radius Pivot	Mirror PixelView II	Mirror PixelView I
Screen size	15"	19"	15"
Viewing area (sq. in.)	90.77	151.58	90.77
WYSIWYG (72 dpi)	No	Yes	No
Vertical refresh	69	78	75
Pop-up Menus	No	Yes	Yes
Tear-off Menus	Yes	No	No
Enlarged Cursor	Yes	Yes	Yes
Enlarged Menubar	Yes	Yes	Yes
Screen Saver	Yes	Yes	Yes
Screen Copy	Yes	Yes	Yes
Full year warranty	Yes	Yes	Yes
Dealer markup	Yes	No	No
LIST PRICE	**$1690**	**$897**	**$567**

"Try one for 30 days, if you don't love it...I want it back. We ship 95% of our orders within 24 hours, so you'll be saving money and time."

Ronald Eibensteiner, President/CEO

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Circle 341 on reader service card

The Best Macintosh Training Solution For SmallerTraining Budgets

60% of all new software purchased is abandoned within 3 weeks according to a recent survey in *PC Magazine*. Statistics show that hundreds of thousands of dollars are wasted by companies and by individuals who purchase software programs that are never used.

The survey only mentioned programs that have been put away on the shelf. It didn't add in the staggering number of computer users who use *only ten to fifteen percent of their program's capabilities.*

Think of the price of today's Macintosh software. It isn't cheap! Is this money wasted? Only if your Macintosh is half used, if your programs have been stuck on the shelf, or if your Macintosh users are not 100% trained on the computer and each business program.

An Expensive Irony.

Right now thousands of individuals and companies are considering buying faster, more powerful, and more expensive computers. They are also spending thousands more on software upgrades and new software purchases.

Ironically, few are budgeting equal amounts of money for training. The simple truth is that *training* is the least expensive investment you can make. New equipment can increase productivity by micro-seconds. *Training* can increase productivity by days and weeks.

Training Options.

MacAcademy was the first company to nationally offer both live workshops and video training. MacAcademy has specialized in Macintosh training for the past four years and has trained over 50,000 Macintosh users. VIDEO TRAINING is an ideal training solution for companies facing ever-smaller training budgets. Video training is effective, fast, and the least expensive training option available.

Why Video Training?

Speed Learning: The Macintosh is a graphics based machine. It thinks and operates through the use of pictures. Unlike the IBM which is character and keyboard based, the Macintosh is a visual machine. *The emphasis is the screen.* The best way to learn the Macintosh is by *seeing* each technique taught on the actual Macintosh screen. A MacAcademy Video shows you step-by-step each Macintosh technique. Each software technique is clearly and visually taught to the new user.

Flexibility.

Videos can be used by individuals or shown to entire companies. Videos can be checked out and taken home by new employees. Videos can be fast forwarded and rewound to review key techniques. Videos are easy. Studies have shown that many Macintosh users are lazy. Training programs that take a great deal of individual time and effort end up sitting right next to the abandoned software. People already are used to watching videos. MacAcademy videos are usually watched within the first two days!

Quality.

There are other video training programs out there. Most of them are only 45 minutes to an hour in length. Nearly all MacAcademy training videos run a full two hours. Each trainer featured on MacAcademy videos is our highest rated instructor for that program from the two-day live MacAcademy workshops featured in over 100 cities throughout the U.S. Our instructors are not actors or software sales people. They are business executives who have been chosen from hundreds of applicants due to their excellent teaching skills, their thorough knowledge of the program, plus their hands-on business background using the featured program. MacAcademy instructors are unmatched in the industry.

Selection.

MacAcademy now offers over 45 different Macintosh training videos (see next page for complete selection). In most cases we offer video training for beginners, for intermediates, and for the more advanced user.

Price.

Each video is only $49. If you pay hundreds of dollars for the program and thousands of dollars for the computer, doesn't it make sense to invest $49 to make that original investment even more valuable?

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MacAcademy is the most trusted name in Macintosh training. Over 10,000 companies currently rely on MacAcademy video training. We invite you to invest in the most effective and valuable Macintosh training available. If, for any reason, for a full 30 days after receiving your Video Training Tapes, you are not totally satisfied, simply return the tapes for a full refund.

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producing high-quality artwork, page layouts, and so forth. The typical workstation consists of a Mac, a scanner, and an output device such as the CrystalPrint Publisher II or an Apple LaserWriter IINT. The workstation with the Publisher II is less cluttered and more productive due to the small footprint of the Publisher II. One of the main reasons for this small footprint is the 100-sheet paper tray. Our users seem to have no problem refilling the paper tray once or twice a week as their needs dictate. The smaller paper capacity seems to be a trend that Qume started. Look at the QMS-PS 410 with its 50-sheet input or the HP IIP with its 50-sheet standard input capacity. This seems to signal a trend toward smaller paper trays for desktop–personal page printers.

We did not "graft" a manual feed to the rear of the Casio engine. We listened to our customers and worked with Casio to produce the LCS-130B with a manual feed to support envelopes and heavier paper stock. We guarantee the manual feed to support between 16-pound and 30-pound paper stock (I have fed 80-pound stock through it without problems).

When we launched Publisher II it did not support the Adobe Type 1 font format, but in September we announced a free upgrade. Heid was informed of this when he got his review unit. All Publisher II owners have been sent free Type 1 upgrades, and all dealer and distributor stock has the Type 1 upgrade installed.

There are three mistakes in the features comparison chart. The standard Publisher II has 3MB of memory, not 2MB. The other emulation in the printer is the LaserJet Series II, not the LaserJet Plus. These optional paper trays are available for the printer: legal, A4, and B5.

Michael K. Harris
Qume Corporation
Milpitas, California

Although the QMS-PS 410 and HP LaserJet IIP each come with 50-sheet trays, both accept optional 250-sheet trays. Of the other recently introduced personal printers, Abaton's LaserScript and Microtek's TrueImage each hold 150 sheets; GCC's PLP II and BLP II each hold 200; and Apple's Personal LaserWriters, TI's microLaser, and NEC's SilentWriter2 Model 9 each hold 250.

Generally, the Publisher II handled manual-feed tasks acceptably, although some wrinkling occurred when it printed envelopes. But the new manual-feed slot is inconveniently located—you must bend over the printer and crane your neck to ensure you're feeding the paper correctly.

When we contacted Qume's public relations firm (after the review was written) to verify the lack of support for Type 1 fonts, no mention was made of the upgrade. Although the printer can now render Type 1 fonts, it ignores their hints, resulting in chunky-looking text at small sizes.

We apologize for the errors in the features chart.—Ed. ■

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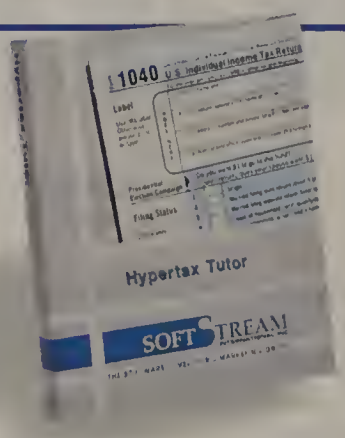

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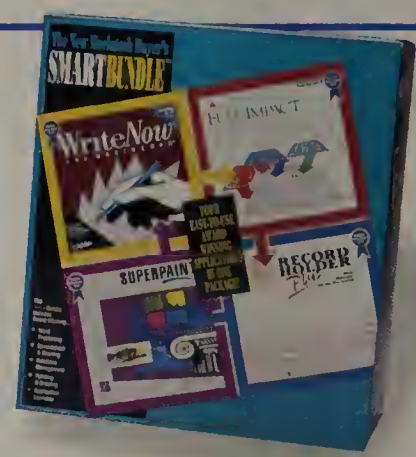

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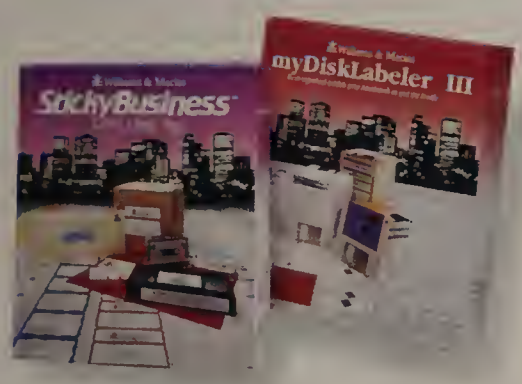

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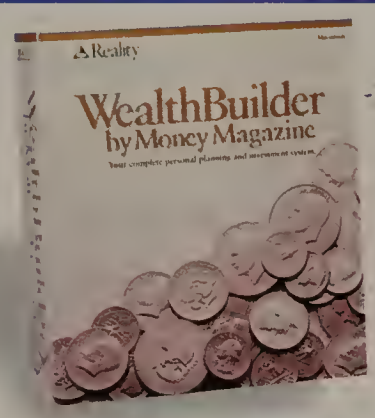
4709 LetraStudio 1.5. . . . . 275.
6300 FontStudio 1.0 . . . . . 359.
6301 ColorStudio 1.0 . . . . . 649.



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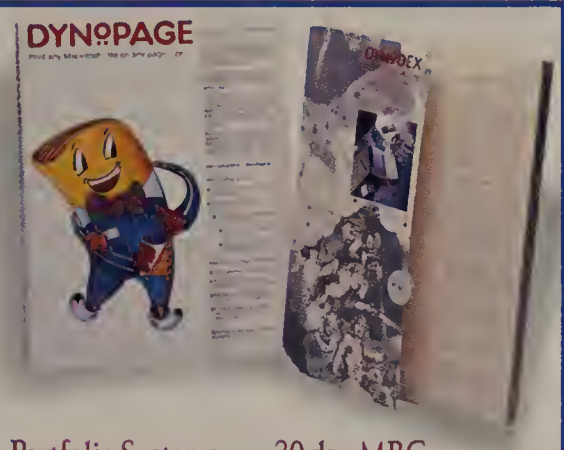

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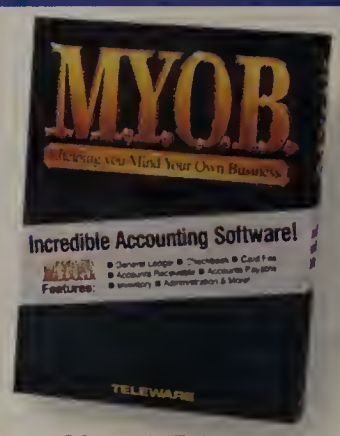

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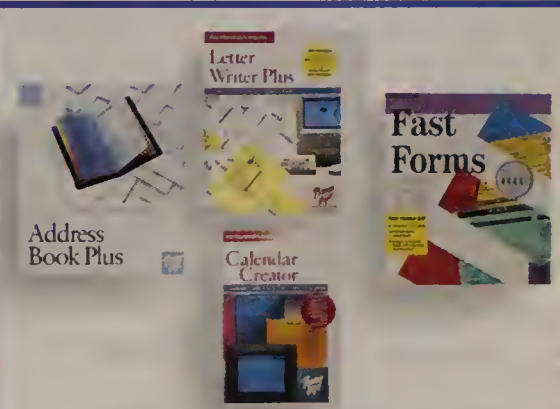

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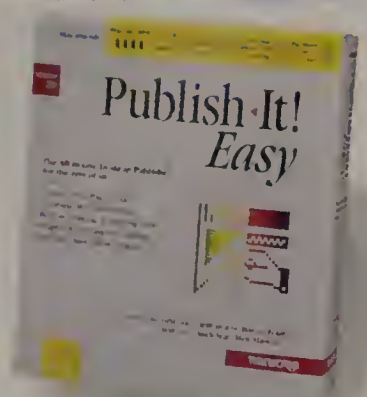

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★Software Toolworks ... 30 day MBG
1842 Chessmaster 2100 1.1 ..... 32.
4619 Mavis Beacon Typing 1.3 *(CP)* .... 32.
4588 Life & Death *(CP)* ..... 32.
6111 Cribbage King-Gin King ..... 39.

★Spectrum Holobyte ... 30 day MBG
Tetris 1.1 or Welltris 1.1 ..... ea. 19.
8180 Faces ..... 22.
8181 Vette! ..... 29.
3459 Falcon 2.2 ..... 30.

★Spinnaker ... 30 day MBG
2328 Sargon IV *(CP)* ..... 28.

StudyWare
ACT, GMAT, GRE, or SAT Prep . ea. 29.
8098 LSAT Prep for the Mac ..... 35.

★Terrace Software ... 30 day MBG
8192 Mum's The Word ..... 81.

★Toyogo ... 30 day MBG
7624 Nemesis Go Master 4.7 ..... 41.
7623 Nemesis Go Master Deluxe 4.7 .... 88.

★XOR ... 30 day MBG
6040 MacGolf Classic *(CP)* ..... 52.
8061 MacSki ..... 40.

NETWORKS & COMMUNICATIONS

★Abaton ... 30 day MBG
6266 InterFax 24/96 Modem ..... 418.

★Beagle Bros. ... 30 day MBG
7691 Flash 1.1 ..... 127.

★CE Software ... 60 day MBG
5638 In/Out *(10 user)* ..... 187.
5173 QuickMail 2.2.3 *(10 user)* ..... 315.

★CompuServe ... 60 day MBG
1676 Macintosh Membership Kit ..... 23.
1673 CompuServe Navigator 3.0 ..... 49.
1674 Membership Kit/Navigator Bundle . 69.

★DataVIz ... 60 day MBG
1823 MacLink Plus/PC 4.5 ..... 117.
4842 MacLink Plus/Translators 4.5 ..... 98.

★Dove Computer ... 60 day MBG
6758 DoveFax Desktop ..... 299.

★Dow Jones ... 30 day MBG
5295 News/Retrieval Membership Package 24.

EveryWare
8077 AllShare 1.0 ..... 139.

★Farallon Computing ... 30 day MBG
5707 Timbuktu 3.1 ..... 95.
4867 Timbuktu 3.1 30-Pack ..... $1285.
4866 Timbuktu/Remote 2.0 ..... 123.
6371 Timbuktu/Remote Access Pack .. 845.
5664 PhoneNET StarConnector ..... 17.
6273 PhoneNET StarConnector 10-Pack . 129.
2203 PhoneNET Connector *(DIN-8)* ..... 31.
4869 PhoneNET Connector 10-Pk *(DIN-8)* 198.
2206 PhoneNET StarController 300 ..... 825.
6687 PhoneNET StarController-EN .... 1599.
6766 MediaTracks ..... 189.
6768 MediaTracks Multimedia Pack .... 319.

★Freesoft ... 60 day MBG
6115 White Knight 11 ..... 85.

Hayes
2300 Smartcom II 3.1C ..... 84.
2307 Smartmodem 2400 ..... 349.
6655 V2400 Baud Modem ..... 469.
5991 V9600 Baud Modem ..... 719.

Information Presentation Tech.
8060 Personal Server Network *(PSN)* ... 108.

Insignia Solutions
7557 Access PC 1.0 ..... 82.
7058 SoftPC-AT/EGA Module ..... 125.
4089 SoftPC 1.3 ..... 245.

Farallon Computing ... 30 day MBG
2199 *MacRecorder Sound System 2.0*–Take advantage of the sound capability in every Mac. Includes a sound digitizer & SoundEdit sound processing software that allows you to record, edit, & mix voice, music, & sound effects $159.

Intel Corporation
5119 2400EX Modem ..... 179.
6265 2400EX with QuickLink II ..... 195.
6420 2400EX MNP Modem ..... 229.
6650 2400EX MNP with QuickLink II ... 249.

★Kennect Tech. ... 30 day MBG
5631 Rapport ..... 195.
Drive 360 or Drive 1200 ..... ea. 249.
5632 Drive 2.4 *(includes FastBack II)* ... 325.

★Microcom ... 30 day MBG
7459 CarbonCopy Mac *(Single, 2 req.)* . 117.
7465 CarbonCopy Mac *(Twin Pack)* .... 169.
8027 MacModem V.32 ..... 689.

★Nuvotech ... 60 day MBG
3000 TurboNet ST *(DIN-8)* ..... 30.
6751 TurboNet ST *(12-Pack)* ..... 279.
6750 NuvoLink II ..... 275.
6272 NuvoLink SC ..... 309.
5277 TurboBridge ..... 319.

★Orchid Technology ... 30 day MBG
6949 OrchidFAX Modem ..... 459.

★Practical Peripherals ... 30 day MBG
3102 2400 Baud External Modem ..... 179.
5285 PM 2400SA MNP Modem ..... 209.

Software Ventures ... 30 day MBG
3455 *MicroPhone II 3.0*–1990 Macworld World-Class Award for *Communications-General*. New version of top-selling telecom software. Build graphic front-ends to remote services and corporate mainframes ..... $215.

3089 Mac Communications Pack 1.5 .. 225.

★Shiva ... 30 day MBG
3444 NetSerial X232 ..... 275.
NetBridge or TeleBridge .... ea. 339.
3443 NetModem V2400 ..... 429.
6917 NetModem V.32 ..... 1429.
6519 EtherGate ..... 1629.
8189 FastPath IV ..... 1899.

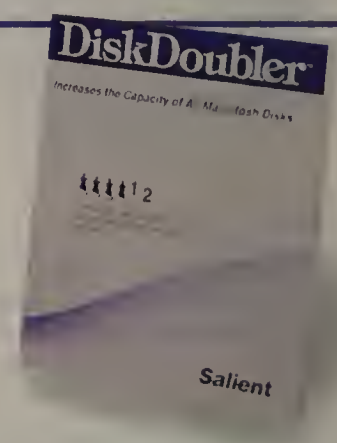
★Sitka/TOPS ... 30 day MBG
4188 TOPS Teleconnector *(DIN8)* ..... 23.
4598 TOPS FlashBox ..... 118.
3720 TOPS Flashcard ..... 155.
7057 MacPrint TOPS Network Version 1.0 165.
6264 TOPS Networking Bundle 3.0 .... 187.

★Software Ventures ... 30 day MBG
3455 MicroPhone II 3.0 ..... 215.

★Solutions, Inc. ... 60 day MBG
6721 MailMaker 5 User Pack 1.1 ..... 119.
6720 FAXGATE Plus 1.1 ..... 246.
4308 BackFax 1.5 ..... 153.

★Synergy ... 30 day MBG
6618 VersaTerm 4.1.1 ..... 88.
6619 VersaTerm-PRO 3.1.1 ..... 174.

★Traveling Software ... 60 day MBG
3729 LapLink Mac III Connectivity Pac .. 93.



Salient Software ... 30 day MBG
7404 *DiskDoubler 3.0*–Expand your disk drive capacity. Fast, easy and safe, DiskDoubler dramatically increases the storage capacity of any Mac drive. "Performance is outstanding," evaluates *MacUser*, 7/90 (4½ Mice rating). $45.

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James R. Florini, Ph.D.
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Syracuse University

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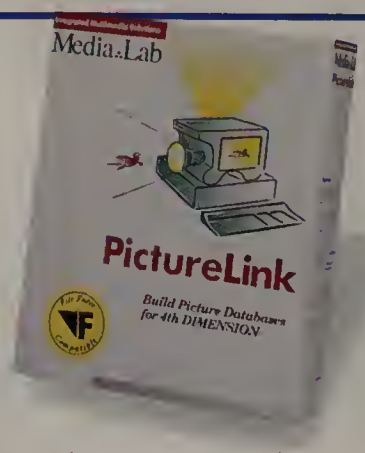
★Abaton ... 30 day MBG
7432 Scan 300/GS *(reqs. Scan Kit)* . . . $999.
★American Power ... 30 day MBG
5895 UPS 110SE . . . . . 209.
6686 UPS 370ci . . . . . 329.
Caere
8124 Typist . . . . . 479.
4476 OmniPage 2.1 . . . . . 539.
OmniSpell or OmniDraft . . . . . ea. 69.
6661 OmniProof . . . . . 105.
★CH Products ... 30 day MBG
7343 Mach IV Plus Joystick *(Quad or ADB)* 51.
7344 Rollermouse *(ADB)* . . . . . 79.
Computer Friends
8271 ColorSnap 32+ . . . . . 649.
★CoStar ... 30 day MBG
6090 LabelWriter . . . . . 185.
6067 LabelWriter Labels . . . . . 11.
★Datadesk ... 30 day MBG
6901 Switchboard *(modular keyboard)* . 159.
6813 Modular Trackball . . . . . 98.
MAC-101 Keyboards . . . . . ea. 129.

Dantz Development ... 30 day MBG
5255 *Retrospect 1.2*–1989 *MacUser* Editors' Choice Award for *Best Backup Software*.
"Retrospect can quickly store data on almost every backup medium. It also makes backup chores as painless as possible" . . . . . $148.

GDT Softworks
6256 PrintLink Collection 3.01 . . . . . 59.
6151 JetLink Express 2.0 . . . . . 89.
Hewlett-Packard
6514 HP DeskWriter Printer . . . . . 759.
★Kensington ... 30 day MBG
Turbo Mouse 3.0 *(Plus or ADB)* ea. 109.
Koala
2593 MacVision 3.0 . . . . . 259.
Kodak
6730 DICONIX M150 Plus Printer . . . . . 489.
★Kraft Systems ... 60 day MBG
7519 KM30 ADB Joystick . . . . . 49.
★Logitech ... 30 day MBG
5082 ScanMan Mac Model 32 . . . . . 319.
Magnavox
6693 9CM080 14" Color Monitor . . . . . 529.
6690 14" Color Monitor with Micron Xceed for SE/30 *(640 x 480)* . . . . *special* 849.
6691 14" Color Monitor with Micron Xceed for Mac II *(640 x 480)* . . . . *special* 849.
MegaGraphics
8-bit System for SE/30 or II. ea. 3495.
7841 24-bit Color System for Mac II 5295.



MediaLab Technologies ... 30 day MBG
8218 *Picture Link*–Adds "Import and Edit" imaging capabilities to 4th Dimension and FileForce. Image database applications include: security, personnel, inventory, marketing/sales, medical and research applications. . . . . $225.

19" Rival Sys. SE, SE/30, or II. . ea. 1269.
19" 8-bit System for SE/30 or II. ea. 4459.
7840 19" 24-bit Color System for Mac II 5995.
19" G/S System for SE/30 or II ea. 2195.
★Micron ... 30 day MBG
6680 Xceed for SE/30 *(640 x 480)* . . . . . 349.
6673 Xceed for SE/30 *(1024 x 768)* . . . . 589.
★MicroSpeed ... 30 day MBG
6620 MacTRAC . . . . . 65.
6621 MacTRAC ADB . . . . . 75.
★Mouse Systems ... 30 day MBG
7560 Trackball ADB . . . . . 69.
Little Mouse or Little Mouse Plus. ea. 75.
★Nutmeg Systems ... 30 day MBG
7920 SE/30 Color Video Interface . . . . . 339.
15" Monitor: SE, SE/30 II or IIsi ea. 599.
19" Monitor: SE, SE/30, II or IIsi ea. 995.
★Orange Micro ... 30 day MBG
3036 Grappler *(9 pin)* . . . . . 87.
6229 Grappler LX . . . . . 128.
Pacific Data Products
7412 Pacific Page PE 4.0 for the Mac . . 529.
RasterOps
We carry RasterOps full line.
7463 ColorBoard 264 for Mac II. . . . . 549.

Cutting Edge ... 30 day MBG
5456 *45 Meg Removable Drive*–Offers the convenience of removable media with the reliability of Winchester technology. Features the popular Syquest mechanism & includes a cartridge. $699.
5736 *45 Meg Removable Cartridge* . . . . . 89.

7469 ColorBoard 264 for SE/30. . . . . $659.
7457 Video ColorBoard 364 . . . . . 1459.
7462 RasterOps 8L ColorBoard. . . . . 1459.
7468 ClearVue/GE System for Mac II . . 1699.
SAFE Power Systems
4561 250 Watt . . . . . 199.
Sophisticated Circuits ... 30 day MBG
8009 PowerKey . . . . . 65.
8008 PowerKey Wake-Up Cable . . . . . 32.
TheComplete PC
6104 Half-Page Scanner/400 . . . . . 295.
6103 Full-Page Scanner . . . . . 758.
Thunderware
3648 ThunderScan Plus ThunderWorks. 199.
4994 LightningScan 400 . . . . . 385.
Total Systems
Gemini Accelerator . . . . . call

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1107 1 Meg SIMMs *(80ns)*. . . . . 57.
7497 1 Meg SIMMs for Mac IIfx *(80ns)*. . . call

ON Technology ... 1 year MBG
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★Cutting Edge ... 30 day MBG
3989 800K External Disk Drive . . . . . 149.
5133 20+ Meg Hard Drive . . . . . 329.
3990 30+ Meg Hard Drive . . . . . 389.
3991 45+ Meg Hard Drive . . . . . 449.
5275 60+ Meg Hard Drive . . . . . 489.
5276 80+ Meg Hard Drive . . . . . 539.
5456 45 Meg Removable Drive . . . . . 699.
5736 45 Meg Removable Cartridge. . . . . 89.
★Dove Computer ... 60 day MBG
MaraThon 030 for Plus, SE or II ea. 529.
8186 MacSnap 524XE. . . . . 199.
8187 MacSnap 524XS . . . . . 269.
★Micron ... 30 day MBG
7149 Xceed IIci-128 Cache Card . . . . . 269.
★Pacific Rim ... 30 day MBG
7382 Platinum 800k Drive . . . . . 145.
Quantum
40 Meg & 80 Meg Internal Drives for Mac SE, SE/30, IIx, IIfx, IIci & IIcx . . call
★SuperMac Tech. ... 30 day MBG
7451 Dataframe XP 200 Hard Drive . . . 1399
5451 Dataframe XP 330 Hard Drive. . . 2249

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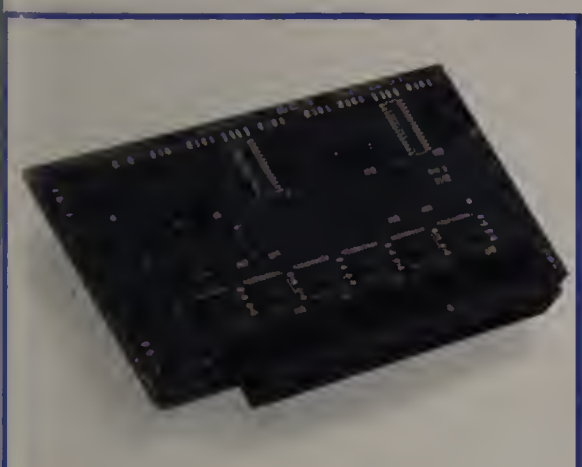

Micron ... 30 day MBG
7149 Xceed IIci-128 Cache Card–128K Fast Static RAM cache card for the Mac IIci, the new leader in price performance. Fully compatible with Mac software ..... $269.

ACCESSORIES

Apple Computer

6717 MIDI Interface ..... 84.
7748 Personal LaserWriter Toner Cart.... 89.
1114 LaserWriter Plus Toner Cartridge... 99.
1115 LaserWriter II Toner Cartridge .... 105.

★Avery ... 60 day MBG

4807 Laser Labels 1" x 2⅝" *(Qty. 3000)* ... 24.
4864 Disk Labels 3½" *(Qty. 250)* ..... 13.
5392 Disk Labels 3½"-*Laser (Qty. 630)* .. 29.
4865 Address Labels 3½" x 15/16" *(3750)* . 15.
4811 Transparencies 8½" x 11" *(Qty. 50)* .. 22.

★Basic Needs ... 60 day MBG

Dust Covers ..... call
Hard Top Keyboards ..... ea. 15.
7413 Mac IIcx/ci Monitor Stand ..... 40.
7417 Cordless Mouse ..... 89.

★Computer Coverup ... 60 day MBG

1723 ImageWriter II Cover ..... 8.
1725 Mac SE Ext. Keyboard Cover set... 10.

★CoStar ... 30 day MBG

7453 The Organizer Jr. ..... 79.
6091 The Organizer ..... 199.

WordPerfect ... 60 day MBG
3800 WordPerfect Mac 1.0.5–Includes a lightning fast, 115,000-word spelling checker, thesaurus with 100,000 synonyms and antonyms, multiple headers and footers, auto-pagination and conditional search and replace ..... $229.

Curtis Manufacturing

6733 GFP-3 *(Glass Filter Plus-Mac Plus, SE)* $65.
8046 MVP Mouse ..... 89.

★Goldstein & Blair ... 30 day MBG

8198 "What Do I Do Now" Book ..... 9.
2267 The Macintosh Bible *(3rd Ed.)* ..... 19.

★I/O Design ... 30 day MBG

2379 MacLuggage Imageware II ..... 49.
2381 MacLuggage Macinware SE ..... 75.
6129 Ultimate SE/Ext. Carrying Case .... 79.

★Kensington ... 30 day MBG

2559 Apple Security Kit ..... 33.
2566 System Saver Mac *(platinum)* ..... 63.
6763 SE Radiation/Anti-Glare Filter ..... 52.
5064 Apple Color Monitor Polarizing Filter 63.

★MacConnection ... 60 day MBG

4623 Solid Oak Disk Case *(holds 90 disks)* 32.

★Moblus Technologies ... 60 day MBG

4470 Fanny Mac QT ..... 55.

★Moustrak ... 60 day MBG

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2694 Moustrak Pad *(standard 7" x 9")* ... 8.
2692 Moustrak Pad *(large 9" x 11")* ..... 9.
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3255 ImageWriter II Ribbon Black ..... 4.
3261 ImageWriter II Ribbon Multi-4-Color . 9.

★Sopris Softworks ... 60 day MBG

4019 Mac SE & Ext. Keyboard Cover *(navy)* 15.
4017 ImageWriter II Cover *(navy)* ..... 11.
4014 High Trek Mac SE & Ext. Kybd. Case 69.

★Targus ... 60 day MBG

3618 ImageWriter II Carry Case ..... 45.
3617 Mac Plus/SE Carry Case ..... 55.
4015 Mac SE & Ext. Kybd. Carry Case .. 69.

★Tripp Lite ... 30 day MBG

6200 Isobar 6 *(surge suppressor, 6 outlets)* . 59.

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★Sony ... 60 day MBG

3297 3½" DS/DD Disks *(10)* ..... 13.
6148 3½" DS/DD Disks 3 Pak *(30)* ..... 30.
3298 3½" HD Disks 1.44 Meg *(10)* ..... 22.
6375 3½" HD Disks 3 Pak *(30)* ..... 56.
6659 QD2040 40 MB Data Cartridge .... 19.

★MacConnection ... 60 day MBG

6592 44 Meg Removable Cartridge ..... 85.

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★MAXELL ... 60 day MBG

2792 3½" DS/DD Disks *(10)* ..... 14.
2793 3½" HD Disks 1.44 Meg *(10)* ..... 27.

★3M ... 60 day MBG

3943 DC2000 40 MB Data Cartridge .... 20.

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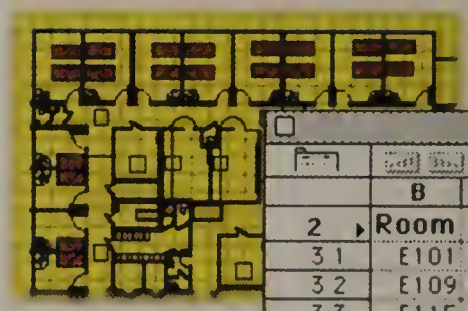

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	B	C	D	E	F
2	Room		Area	Cost	Total
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32	E109	•	512 56	$51	$26272
33	E115	✓	245 64	$25	$6034
34	E111	•	469 26	$47	$22020
35	E103	•	917 28	$92	$84141

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ART BEAT

by Cathy Abes

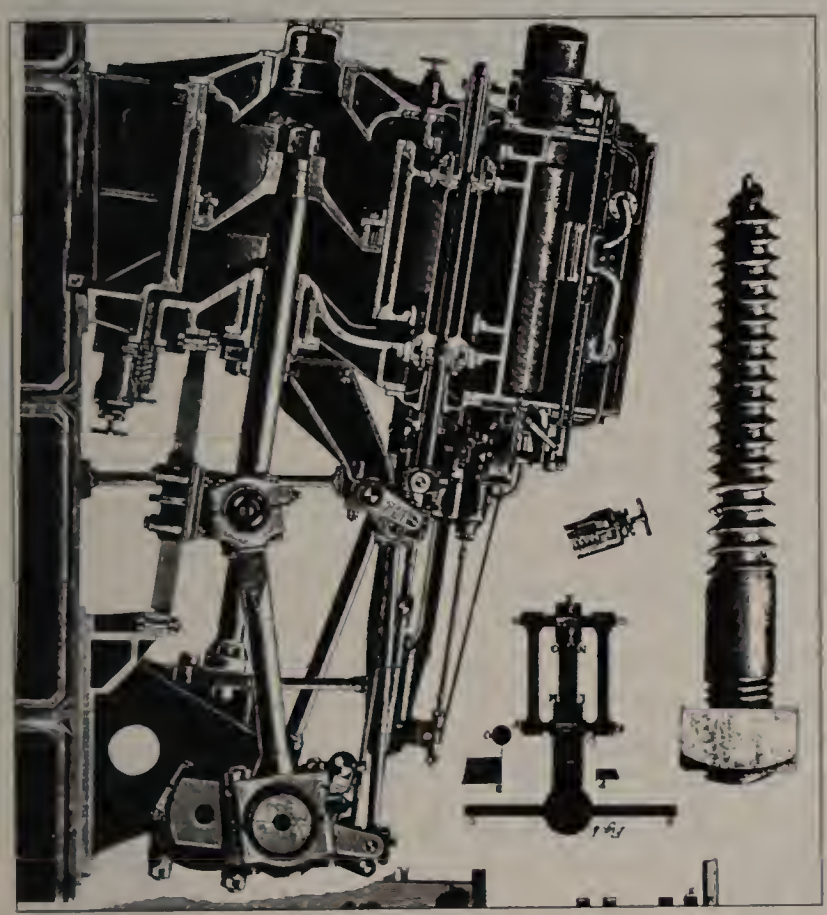
The tools and the talent behind Macworld's graphics and the techniques that make them possible

Artist: Erik Adigard says his experience in video-animation is what first brought him into computer illustration. Now the San Francisco–based graphic designer is using the Macintosh to explore new illustration techniques that he can also apply to his animation projects. "I'm getting more and more drawn to painting with the Mac," he says. "Every new graphics application is an invitation to more discoveries."

Tools: Mac II with 8MB of RAM and a 105MB internal hard drive; Barneyscan slide scanner; Syquest 45MB removable-cartridge hard drive; Adobe Photoshop.

How It Was Done: Adigard scanned in numerous images—clip art, drawings, engravings—to produce the intricate illustration that opens our image-compression feature, "The Big Squeeze" on page 128. The translucent green rodlike object that horizontally overlays the top part of the illustration was originally part of a scanned black-and-white engraving. Once he had scanned the engraving into Adobe Photoshop as a bitmap, Adigard lassoed the rod and pasted it into a

(continues)



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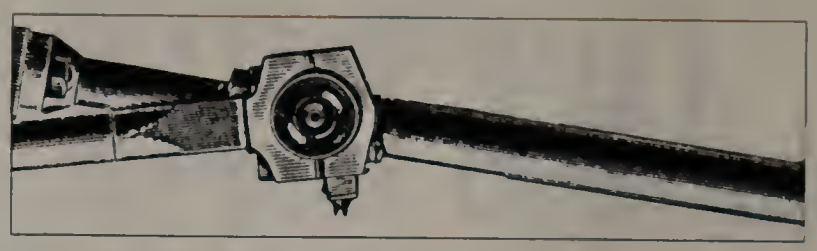

In gray-scale form, the rod was rotated to a horizontal position.

Black areas of the rod were changed to green, and white areas were changed to mustard yellow.

After a duplicate of the original file was created, a new channel was added to it.

Linear and radial gradations were applied to the duplicate rod.

Opacity level was set, color controls were adjusted, and the rod's outline was blurred with the feather tool.

new Photoshop file as a gray-scale image. Next he needed to transform the rod from its original vertical position to a horizontal one. Because the window surrounding the rod was tall and narrow, he first had to resize the window to make it square (Resize command under the Image menu) so that he could rotate the object to a horizontal position. After rotating it, he cropped the object to reduce the size of the window and, therefore, the size of the file. As a result, the new file was trimmed from an unwieldy 1573K to 293K—roughly 20 percent of the original—making it much faster for Adigard to work with. After flopping the image (Flip command under the Image menu), Adigard brought it into RGB color mode and created a custom palette for it.

He began the colorizing process by filling the background with green. Then, to get a blurred edge that would blend into the back-

(continues)

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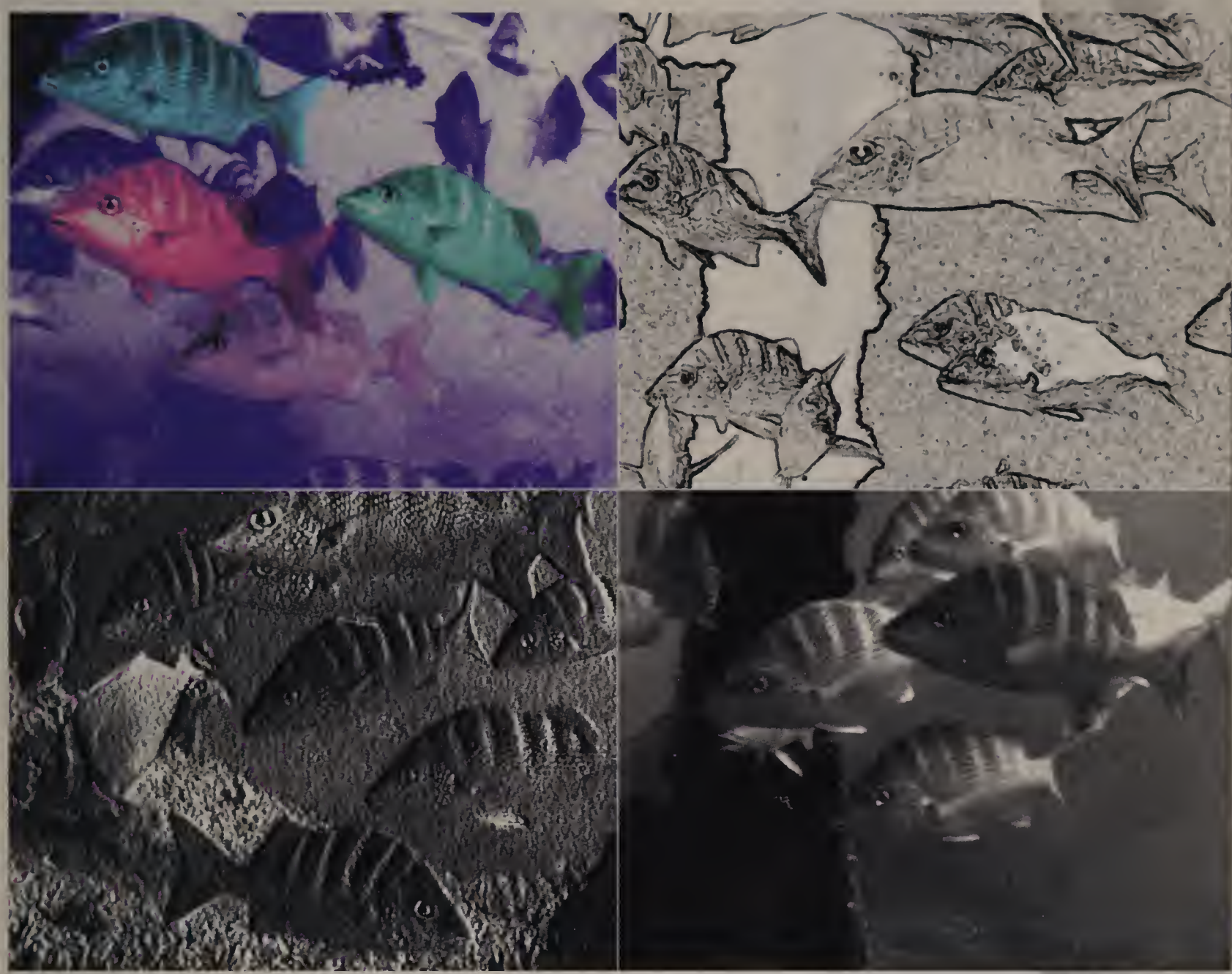

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AVERY

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The rod was pasted into the finished illustration.

ground, rather than a sharp outline around the rod object, he selected all the black areas of the rod with the magic wand and changed them to a shade of green slightly darker than what he had specified for the background. Next he changed the white areas to a mustard yellow.

Next, Adigard decided to give the rod a 3-D effect. First, he selected the whole file and created a duplicate. Then he added a new channel to the existing three his RGB document was born with, one each for red, green, and blue (think of channels as the electronic equivalent of color plates used in traditional printing processes). Adigard created the new channel not to add more color information but to define the shape of the rod so he could work with it more quickly and efficiently.

By working within the newly created channel, Adigard was able to quickly and easily select particular areas of the rod. Using the lasso in Deselect mode, he deselected all the areas he did not want to work on until only the portion he needed remained selected. "I came up with this process—combining different tools—by trial and error," he said. After that he created a gradation, which he applied to the cylindrical part of the rod. Then he selected just the bottom half of the cylinder and reapplied the gradation to give it a tubular look. Using the same process of creating a new channel and working in Deselect mode, he applied a radial gradation to the circular part of the rod.

Once he'd finished the gradations, Adigard copied the image and pasted it on top of the original—using the Paste Controls command to set the degree of opacity. He experimented with different percentages until he found just the right level of transparency and then he adjusted the brightness and contrast of the colors. Although satisfied with the opacity level, he felt the rod still contrasted too much with the surrounding images, so he darkened its color. Next, he reselected the rod (using Select All and then the Inverse command), used the feather tool to further blur the rod's outline, and finally, pasted the rod into the final image. ◻

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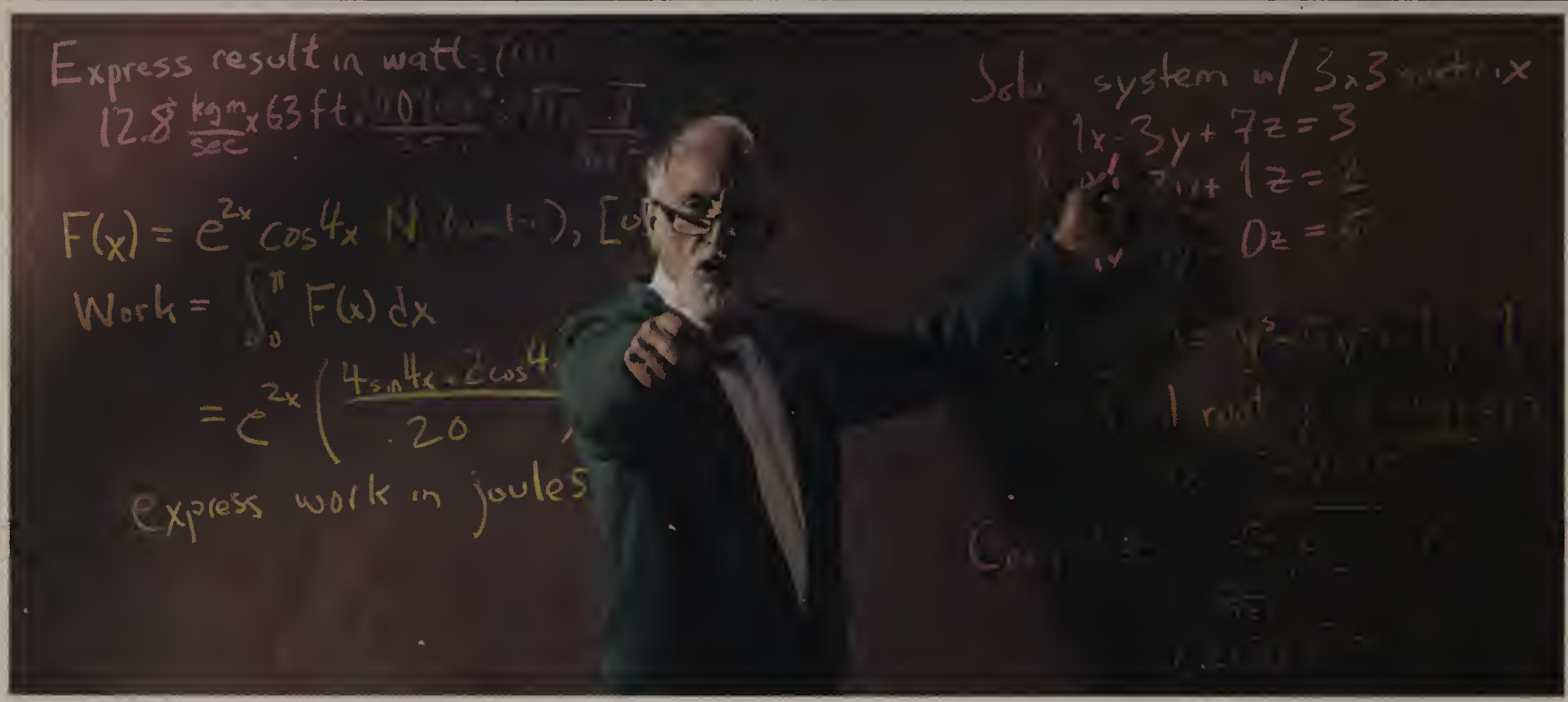

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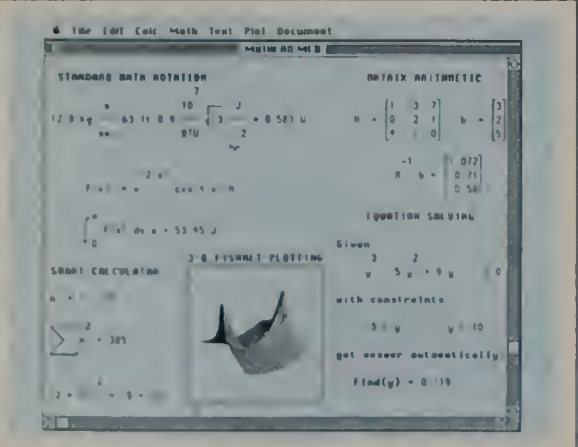

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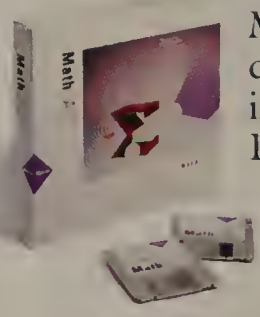

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Circle 34 on reader service card

In the Realm of the Censor

THE ONLINE SERVICE PRODIGY TELLS ITS USERS TO SHUT UP AND SHOP

BY STEVEN LEVY

Log on to Prodigy, the glitzy personal computer–driven videotex service bankrolled by IBM and Sears. At 330,000 households and counting, Prodigy is a budding online behemoth. You get arresting color graphics boasting Prodigy's various features: news headlines; sports updates; stock quotes; airline schedules; banking and grocery shopping; advice columns on finance, computing, travel, and wine. The bottom half of the screen pulsates with animated ads. It is an upbeat world driven by infonuggets and consumerism.

But something is rotten in Prodigyland. If you know where to look, you can step through a series of menus, waiting interminably for a series of screen updates, and finally encounter a section devoted to "member feedback." It's like encountering a mound of South American fire ants on a hitherto pristine picnic spot. The messages here—still sharing the screen with the cartoony advertisements hyping Air France, PS/2 computers, and poor man's Publishers-Clearing-House-style contests—are seething with rage.

"As a new member of Prodigy I feel cheated," reads a typical message. Others refer to the company's policy as "bait and switch," while another calls it "deception at its finest." Many messages end with a threat to leave unless the new charges are retracted; others bid bitter farewell to Prodigy.

Why the unhappiness? Prodigy's pricing restructure, which not only hiked the monthly price by 25 percent, but also instituted a change in policy concerning E-mail between users. Previously the standard charge included unlimited messages. Now Prodigy allows only 30 free messages a month, and charges a quarter for each one thereafter.

But this dispute involves an issue much more significant than a price increase. The crux of this matter is the direction of Prodigy itself, and ultimately the future of personal computer networking. The key issue isn't really pricing—it's censorship.

As it turns out, the complaints appearing online are not the most impassioned ones posted by Prodigy subscribers. By its own admission, Prodigy will not post a message if it deems the content to be seriously detrimental to its own interests. "We are not going to do anything to hurt Prodigy and its advertisers," explains spokesperson Brian Ek. Prodigy contends that it is simply editing, much as magazines edit the raw copy that emerges in the final product. Its members, on the other hand, see no reason why Prodigy has to stifle what they have to say—first by bowdlerizing bulletin boards, and now by prohibitively pricing the private mail that they have adopted as an alternative. The resolution of this question has implications far beyond that hot spot in the Prodigy menu.

ERIK ADIGARD

(continues)

Prodigal Child

Prodigy opened for business in a limited number of cities in October 1988, reportedly the result of a $600 million investment by Sears and IBM. The service rolled out nationally in October 1990. The idea was to create an online shopping and information service directed mainly at those who used computers at home. Prodigy was designed to be nonintimidating and anything but a power-user tool. That much was immediately apparent to anyone who chanced upon Prodigy. The pace at which the screens refreshed could only be described as glacial. Macintosh users in particular had much to howl about, since the Mac version of the software neglected to take advantage of the Macintosh standard, making the hitherto elegant Mac screen emulate the crude graphics of IBM PC–standard computers. And the Mac version was unable to exchange data with any other Mac programs—it didn't even support the top menu bar or let you use desk accessories!

There was one compensation for the sluggish pace and the hideous interface: the price. Unlike other online services, Prodigy charged a single monthly fee of $9.95. This, Prodigy boasted in its ads, enabled customers to exploit all its services, day or night, for an unlimited amount of time.

These included conferencing and electronic mail. But Prodigy officials never really considered these features as its key attractions. It was no accident that compared with other systems, conferencing and E-mail on Prodigy were implemented in a rather brain-damaged fashion. You can't compose messages off-line, transfer files, or even capture messages on disk—the only way to save them is to use a clumsily implemented print function. But an even more onerous circumstance is Prodigy's insistence on screening messages before posting them. Prodigy employs a number of people "with journalistic backgrounds," says Prodigy's Brian Ek, to make sure that certain standards are met. (We've come a long way from Woodward and Bernstein.) These include a standard of decency that assumes that youngsters are reading, an insistence on amiable and nonlitigious discourse, adherence to the topic (users are often unable to open new topics of discussion)—and anything else deemed unsuitable "at the sole discretion of Prodigy," says the member agreement.

Prodigy as a private company is within its rights to limit postings on its service. (Other services do this too, but they seem less restrictive.) But in the long run Prodigy would be better served by opening its disks to all sorts of opinions—and fighting for the right to be regarded as a common carrier, not responsible for the expression posted by its members. (It is interesting that while Prodigy "edits" assiduously, it also requires that members indemnify it for any legal consequences of what might slip by.) Right now, according to Marc

(continues)

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Rotenberg of Computer Professionals for Social Responsibility. "The one thing certain is that the law is not clear in this area."

In any case, there is often a wide gulf between Prodigy's view on editing and what its members consider appropriate. Sometimes they have to remind themselves they are dealing with an American company (admittedly, IBM) and not a totalitarian state. Prodigy member Russ Singer first noticed this when he began participating in a bulletin board called Closeup, in which users could post their opinions on certain political topics suggested by Prodigy. "Fifty percent of my messages came back to me because of editing," he says, pronouncing this last word sarcastically. "I think it's proper to screen out obscenity and vulgar behavior, but Prodigy screens for *content*. They won't allow anyone to take a controversial stand. For instance, I once said, concerning the abortion issue, that some Catholic countries had overpopulation problems. It was bounced back—I guess they didn't want to offend Catholics. But the censorship is so arbitrary! Often you would wait until the editor's shift was over, then resubmit, and the message would be posted."

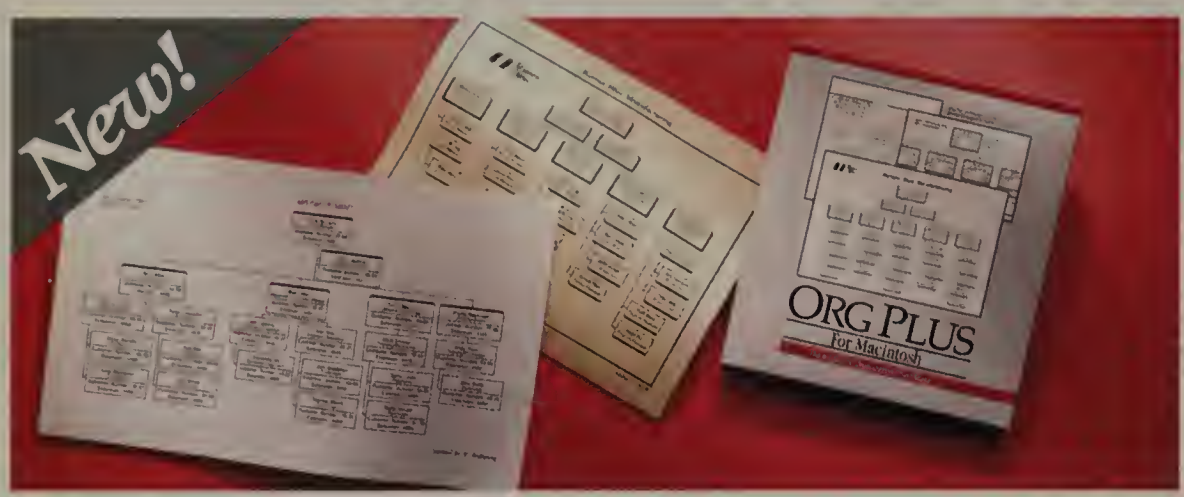
Finally, someone in the Closeup group, fed up with the limits, suggested that some frequent users take advantage of Mailing Lists, a Prodigy feature used in messaging. This would enable up to 21 people to participate in a private discussion group, with postings disseminated to each by the E-mail function. Since private messages are sacrosanct, people could discourse freely. Thus the Liberty Group was formed, and all went well.

One day, a Prodigy bulletin board dealing with health issues—one suffering particular problems with zealous editors—mysteriously disappeared. The participants, many of whom used the board as a support group for fellow sufferers of disabilities, complained in the feedback section, and Singer suggested they take a similar course to his. The health group and dozens of others chose to circumvent those poor faceless souls with journalistic backgrounds and worn-down delete keys, and go private. One member volunteered to keep "the list of lists," which noted all the discussion groups—it came to total about 150, with more than 2000 members, Singer estimates. The list was posted in the About Prodigy section, so that new users could find places to communicate.

Electronic Refuseniks

It seemed to be a brilliant solution, a case of just plain users discovering something of value in a service that the provider never figured on. At first, both sides seemed happy with this compromise, even though it recalls a scenario of pre-Glasnost Russia–dissident groups meeting in small apartments, unable to speak openly in public. They even called it "the E-mail underground." Many people, particularly those who were for various

(continues)



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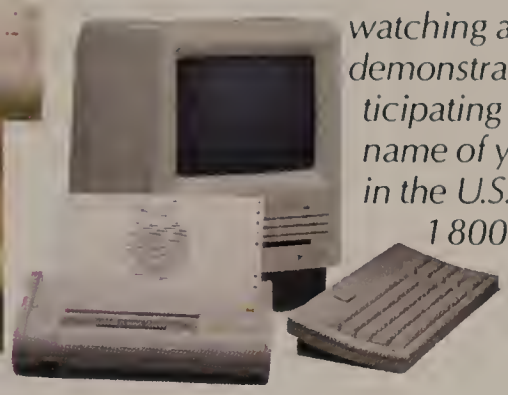

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reasons homebound, came to depend on the groups. Some found the experience mind-opening, others used it to forestall loneliness. And for others, it became near-essential. As a woman recovering from a cerebral hemorrhage put it, "We have come to rely on one another for support, for medical information, for applause. Some of us are bedridden; some in wheelchairs with a pen or an instrument strapped to the wrist to assist us in typing . . . we all have become dependent on each other's help."

But as the volume of E-mail increased, growing 20 percent a month at one point, the powers at Prodigy were not pleased. According to Ek, Prodigy's method of passing E-mail messages incurs costs. In addition, Ek notes, "When you use E-mail, advertising isn't on the screen, so we don't even get indirect revenue." Prodigy's revenues, of course, come largely from its members' online purchases, a percentage of which kicks back to Prodigy. So when people use E-mail, they are not only avoiding the otherwise omnipresent advertisements, but they are not *buying things*. That's yet another reason that the high volume of E-mail became intolerable to the not-yet-profitable company. Ek says this high volume was attributable to a small percentage of users —95 percent of Prodigy members sent less than 30 messages a month. So Prodigy decided to use that number as a ceiling for free messaging.

When the announcement of E-mail charges came early last September, there was an eruption of protest from private discussion groups. Who can blame them—in a typical group of 20 members, two messages would put a subscriber over the limit, and bills of hundreds of dollars could easily be incurred. Many members felt duped by Prodigy's advertising claims that everything would be available for one flat fee. Some people even submitted messages suggesting a boycott of Prodigy and its advertisers. But those messages, of course, were stopped by people whom you can call editors or censors, depending on your point of view.

Drawing on the private message membership, some users organized into The Cooperative Defense Committee. One of its leaders, a California writer named Penny Hay, says, "We want to be taken seriously, and document that we are a significant part of Prodigy." She hopes Prodigy management will negotiate with the group and reach some sort of compromise where the private groups can flourish without onerous costs. When I asked her why the unhappy members don't just take their business elsewhere, she explained, "What you get for $9.95 a month here is unique—and besides, we have a community here." In her view, the protest group includes some of the service's best customers.

Prodigy to Users: Drop Dead

But Prodigy has a different view. As Brian Ek explains, E-mail was never intended to be the strong suit at

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Prodigy, which has plans to increase its depth of consumer-directed information and shopping services, and presumably to deemphasize the member-to-member aspect that gives networking its human dimension. "We made a business decision, taking our membership into account," says Ek. The protesters "can either rethink their E-mail use, or put a dent in their pocketbooks. We *could* have said 'E-mail's gone—forget it.' Those people who don't like it can migrate their groups to another company."

So it boils down to this: the protesters want Prodigy to be something it's not. Prodigy is well within its rights to do what it wants, including its current response, which essentially instructs its dissident customers, including disabled people who naively believed its advertising, to drop dead. Despite the bad publicity, some think it's a good economic move. "The issue is a tempest in a teapot," says analyst Gary Arlen, who tracks information services. The protest contingent, he surmises, is "a tiny fraction." (Penny Hay claims that more than 20,000 users support the protest.) In any case, says Arlen, "All of them will be out of the picture, so who cares?"

Ultimately, we all should care. I see this as a test case in the history of telecommunicating, a highly capitalized attempt to network personal computer users. But instead of truly harnessing the potential power of a virtual community of millions, Prodigy officials choose to see users as credit card–bearing sheep. The company could encourage users to be active, to use technology to expand their minds, to seek each other out and form dynamic links. But it does not. Prodigy's goal, as Gary Arlen puts it, is to be primarily an online shopping mall, though it doesn't offer comparison shopping and "real shopping malls don't have cover charges." Creating an environment focused on consumption, Prodigy restricts its users' thoughts to a child's level, assiduously prevents provocative expression, and stifles any utterance it perceives as a threat to its business or its advertisers. (In fact, as this column went to press, Prodigy terminated the accounts of several users involved in the price-hike protest for "harassing" other members by sending them mail on the issue. Prodigy also banned new postings regarding the protest.)

Anyone interested at all in the future of the personal computer and the empowerment it can give to all of us should be disgusted at this waste of a potentially rich resource. Prodigy is a disaster, a plague, the worst thing to happen to telecomputing since call waiting. This is a sentiment, of course, that you will probably never see expressed in the member feedback section of the About Prodigy bulletin board. Which is exactly the point. ■

Steven Levy, a Macworld *columnist, is currently writing a book on artificial life.*

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Data compression	✓			✓	✓		
Save file/folder selections	✓			✓	✓		
DATA RECOVERY	✓	✓	✓				
Selective/intelligent search	✓		✓				
Pause & view during undelete	✓						
Recover files in-place	✓						
OPTIMIZER	✓	✓	✓			✓	
Visual display of fragmentation	✓					✓	
DATA PROTECTION	✓	✓	✓				
FILE LOCATE	✓		✓				✓
HARD DISK PARTITIONING	✓	✓					
FILE ENCRYPTION	✓	✓					
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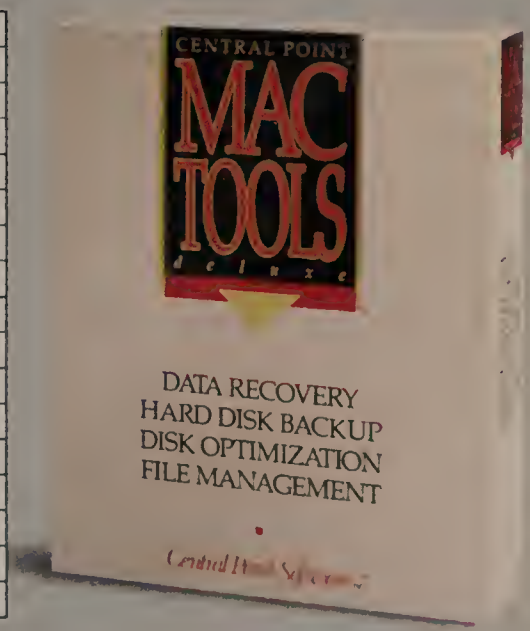

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Sensational Shareware

User groups pick 31 favorites

BY DEBORAH BRANSCUM

As the holidays approach, programs that are both inexpensive and useful are appealing gift ideas. But there are hundreds of shareware and freeware programs available, and not all of them work well. *Macworld* asked representatives of several user groups to choose their favorite programs.

Utilities

Utilities are at the top of the list. The most popular titles include Boomerang, Compactor, Disinfectant, Easy Envelopes, McSink, and SuperClock.

According to Ahorn Balsam of the New York Macintosh Users' Group, and many others, **Boomerang 2.0** is one of the best utilities around. Written by Hiroaki Yamamoto, this $30 INIT resource lets you navigate folders quickly and easily.

Compactor 1.21, by Bill Goodman, is a speedy $25 compression utility that is faster and compacts more than StuffIt or StuffIt Deluxe, according to Eliot Lipps, disk librarian for the Los Angeles Macintosh User Group. It can also build self-extracting archives, enabling users to access files without the program, and can add password protection to sensitive files.

Disinfectant 2.1 is a free virus-detection and -repair program by John Norstad of Northwestern University. The program recognizes Scores, nVIR, INIT 29, ANTI, MacMag, WDEF, ZUC, MDEF, Frankie, and CDEF viruses, as well as their known variations and clones.

Steven Black, the disk librarian for the Macintosh Users Group of Corvallis (Oregon), speaks highly of **Easy Envelopes+ 2.02**. Written by Andrew Welch of Mark 3 Software, this $15 DA maintains up to 99 searchable addresses and prints on a variety of printers in a variety of styles.

McSink is a $45 DA recommended by John Carpenter, the director of software exchange for the BCS Mac user group in Boston. The program, which is written by Dave McWherter, enables you to manipulate the contents of the Clipboard in more than 20 ways. Its commercial counterpart is Vantage, and it supports Vantage XCMDs.

Several folks have recommended **SuperClock**, the classic control panel resource by Steve Christensen. Now in version 3.9, this free menu bar clock works with MultiFinder and includes a countdown timer, a sleep feature for the Macintosh Portable, and much more.

Other utilities of note include Conversion DA, FileList, Floppy Fixer, INIT CDev, MaxAppleZoom, Quill, Reader, SoundMaster, the FONDler, TimeLogger, and Virus Detective.

Fred Showker of the Shenandoah Macintosh User Group (Harrisonburg, Virginia) swears by **Conversion DA**, by Rick Johnson. This free DA converts many measures, including units of length and weight, dry and liquid measures, fractions, numerics, and yes, model-railroad scales.

A favorite of Jeffrey Kraus, the software librarian for the Madison Macintosh Users Group (Wisconsin), is **FileList 1.2** by Erny Tontlinger. This free file-and-disk organizer can catalog all the files on a volume and display and sort the information in a variety of ways.

Floppy Fixer by Frank Beatrous is a utility for recovering files from damaged Macintosh disks, an inexpensive alternative to sending your floppies to a service. The author requests a $20 donation to a specific charity.

You can switch on and off Start-Up, cdev, and Chooser files in the System Folder by using **INIT CDev 3.0** by John Rotenstein. If you have many files, you can simply turn them off instead of removing them from the System Folder. Rotenstein's requested payment: a postcard.

MaxAppleZoom 1.2 by Naoto Horii increases the Mac II display area from the conventional 640 by 480 pixels to 704 by 512 pixels. The $25 control panel resource works with 4-bit and 8-bit Apple video boards with only one display.

A free DA called **Quill** by Sergio Villone lets you read files saved in sev-

(continues)

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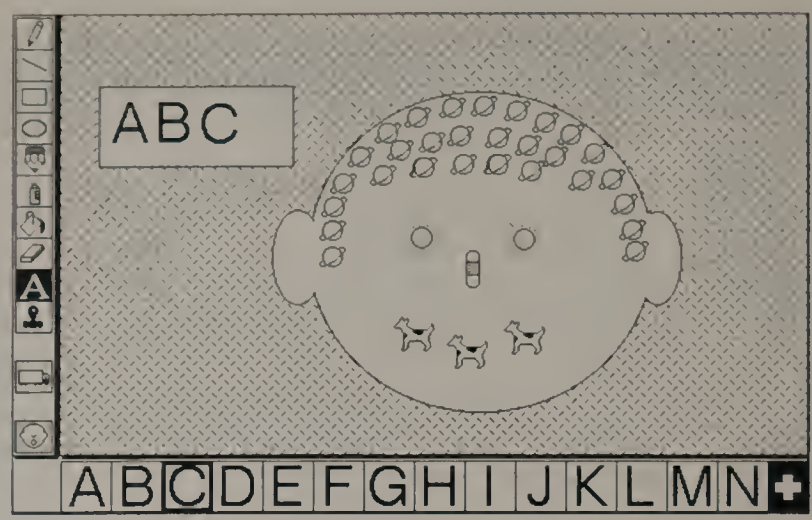

KidPix is a great free drawing program for the three-and-over set.

eral formats, including MacWrite, MacWrite II, and Microsoft Word (1.xx and 3.xx versions).

Reader 1.01 by Kevin Parichan lets you open a variety of files without the original applications, including text, PICT, and SoundEdit files. (There are no special terms for use.)

The enemy of silence, **SoundMaster 1.3.1** is a classic control panel resource by Bruce Tomlin. For a mere $10, this cdev makes it possible for the Mac to express itself loudly during start-up, shutdown, and many operations in between.

Jim Lewis is author of **the FONDler 1.22**, a $10 alternative to the Font/DA Mover that is designed to help you avoid font conflicts.

TimeLogger 2.12 is a DA by Lofty Becker that lets you track the time you work on a project, billing rate, and client. (Terms for its use are not listed.)

Virus Detective is recommended by Darryl Lewis, president of the National Macintosh Computer Society (Tamarac, Florida). This $40 program identifies and removes viruses and is user configurable.

Top-Rated Games

Solarian II by Ben Haller dominates the list of great entertainment programs. I've found this $25 color shoot-'em-up can be addictive—and I don't even like games. **Pararena 1.1** by John Calhoun of Soft Dorothy Software is a challenging cross between roller derby and skateboarding, in black and white. The Shareware fee is $8.

BCS Mac's Carpenter is a fan of three $10 solitaire games by Michael Casteel: **Canfield 4.0, Klondike 4.0,** and **Golf 2.0**. All support color on Mac IIs and are reportedly addictive. Also mentioned as favorites are two $10 solitaire games by Eric Snider: **Baker's Dozen** and **Montana.**

Billiards is a black-and-white game for two players by R. Crandall, S. Gillespie, and S. Lew. (There are no terms on its use.)

Glider+ 3.0, another game by John Calhoun, requires you to keep a paper airplane afloat in a house. A cat stalks the halls, waiting to pounce. It's yours for $5.

MacTrek is a free Star Trek game from 1986 by Travis Butler.

(continues)

Pararena offers thrills and chills or humiliating losses, depending on your manual dexterity.

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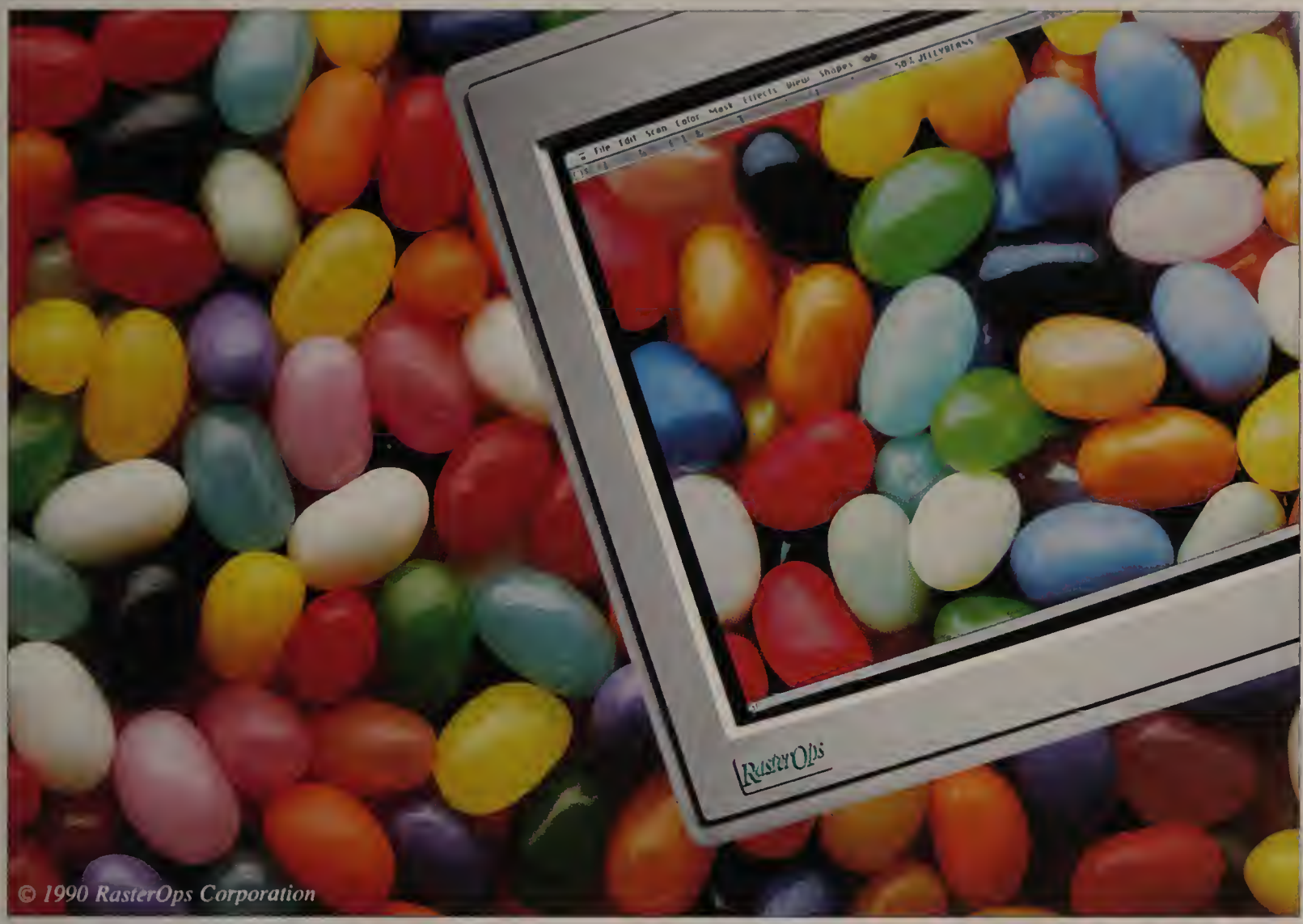

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Stained Glass is something like a challenging form of checkers, involving brightly colored tiles that change color as you jump over them. The $25 game was written by Nick Schlott.

Generally Great Stuff

Eyeballs is one half of the **Eyeballs and Critters** set of free INITS by Ben Haller. Fans like the eyeballs that blink and move on the menu bar. (Others may prefer the wandering big feet.)

KidPix is a delightful pint-size drawing program for the younger set that includes a rubber-stamp tool and a fabulous firecracker eraser. The shareware version by Craig Hickman is free; a commercial version with more features is also available from the author for $25.

Zterm is a powerful communications program that several software librarians list as a must-have. Written by Dave Alverson, this $30 application includes auto and queue dialing, X/Y/ZModem and QuickB file transfers, and vt100 and PC ANSI-BBS emulation.

Resources and Sources

An invaluable resource for shareware enthusiasts is the *BCS Mac Software Exchange Library Catalog*. The result of six years of effort, the $10 volume helps readers sort through hundreds of programs by providing ratings for ease-of-use, overall quality, as well as thumbnail descriptions and program requirements. You can reach BCS Mac at 617/625-7080.

The software mentioned in this column should be available through user groups, online services, and commercial distributors such as Budgetbytes and Educorp. (If you're not a user group member, call Apple Computer at 800/538-9696, ext. 500, for a list of groups near you.)

Several MUGs now provide public-domain software collections on CD ROMs. The GEM CD was introduced at the fifth National Apple User Group Conference held near Chicago last spring. The result of contributions by many user groups, it contains much more than shareware and is available for $119 from InterChange (708/665-6319). BCS Mac offers a similar CD ROM for $125. BMUG's popular $100 CD ROM, with 600MB of public-domain software, should be out now in version 2.0 (415/549-2684).

Please don't forget that no matter what the source, you must abide by the terms of the shareware. Shareware authors need encouragement to keep improving their creations. So don't be bashful or stingy—pony up payment for the programs you use. ■

(Thanks to Loren Stein for research assistance.)

SERVICE HEROES

Mary Emily Hamilton of Ardmore, Pennsylvania, writes in praise of Kensington Microware. "Last year, when I needed to relocate my copy holder, Kensington sent me fresh Velcro free of charge. Then, last week, when my Turbo Mouse Plus malfunctioned, they had me up and running again within 48 hours. Along with my mouse, they sent me a complimentary Side Clip for holding copy on either side of my Mac."

A reader in Jacksonville, Florida, is unhappy with Jasmine but pleased with Microtech. Jasmine offered to send David C. Jones a bulb so the "in use" light on his hard drive would work—but never followed through. Jones read that Microtech was performing warranty repairs on some Jasmine drives and called "a very helpful Janice, who listened to my tale." Janice said she had the replacement bulb in front of her and, with her supervisor's permission, would send it along. The light bulb arrived quickly and "I am pleased to report that it works perfectly," writes Jones.

Send nominees for sainthood to Service Heroes, Macworld, *501 Second St., San Francisco, CA 94107 or via AppleLink (Macworld1) or Connect or America Online (Branscum). Conversely, drop* Conspicuous Consumer *a line if a company is ignoring you*

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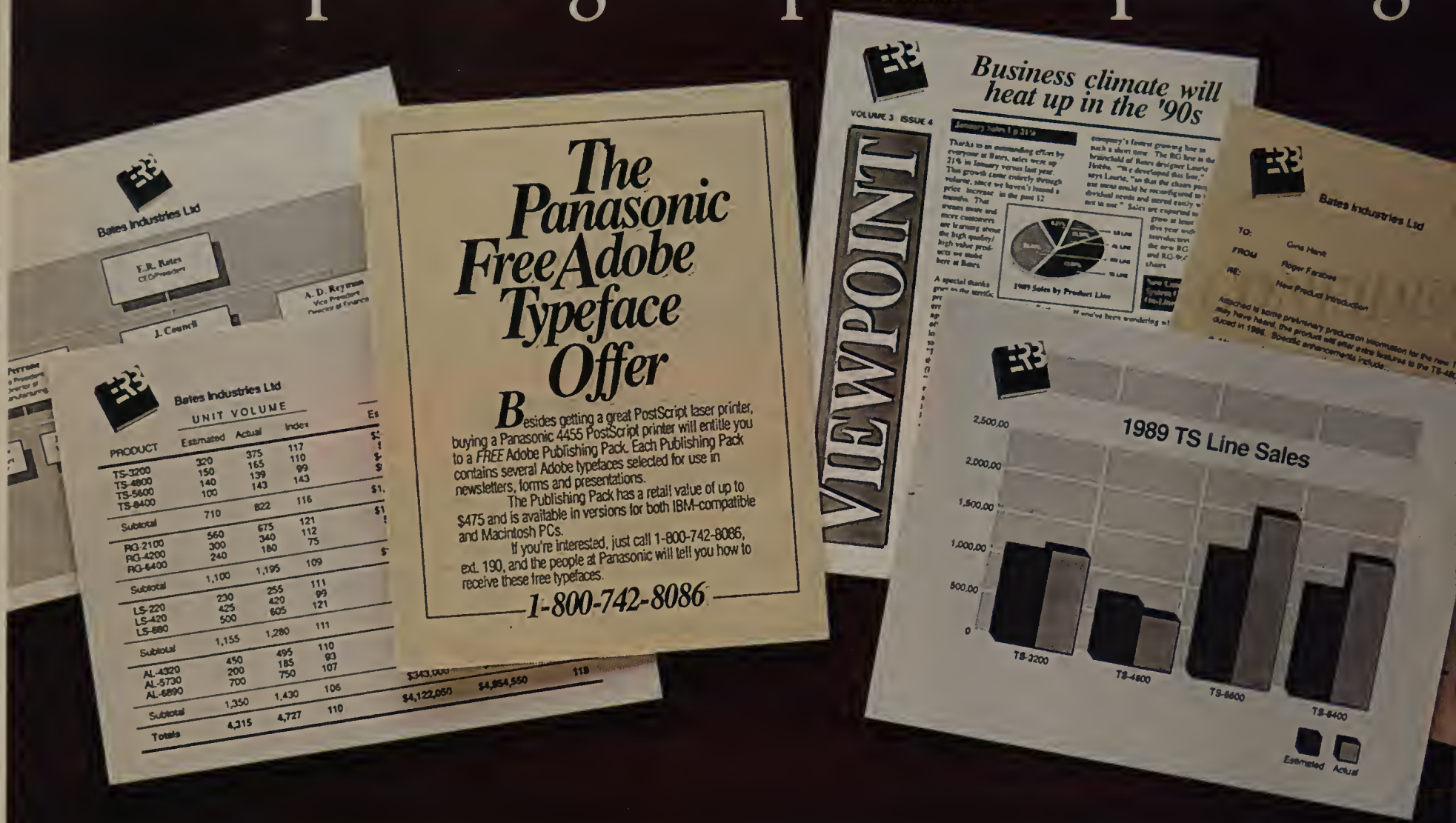

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Blocking the Alpha Channel

THE DIFFERENCE BETWEEN 24- AND 32-BIT COLOR MAY NOT BE EASY TO SEE

BY BRUCE F. WEBSTER

When Apple released 32-bit QuickDraw in the spring of 1989, its goal was to improve the quality, power, and flexibility of Color QuickDraw. To that end, the company defined a graphics display mode allowing 32 bits per pixel. Of these, 24 bits—3 bytes—were used to define the pixel's actual color. That left another 8 bits undefined and unused, seemingly wasted.

At that point, Apple had the opportunity to lay the foundation for QuickDraw's migration into serious graphics and video work. At the same time, Apple could have established a standard for image format and usage among third-party graphics products and developers. All Apple had to do was declare that those 8 bits were to be used as an alpha channel, define how those bits were to be interpreted, implement the appropriate compositing functions, and modify existing QuickDraw routines (such as CopyMask) to allow easy—and standard—methods for modifying the alpha channel values.

Apple did none of that. Instead, it abdicated to those few third-party developers—RasterOps, NuVista, and others—who have since forged ahead on their own. The results—lack of standards, lack of support, lack of products that make use of such functionality—may constitute a serious handicap for the Mac as the color graphics–workstation market heats up.

Of QuickDraw and Alpha Bits

The original version of QuickDraw allocated 1 bit per pixel; that bit indicated whether the pixel was to be set to the current foreground or background color. Those colors were normally black and white, respectively, but could be set to one of eight predefined colors; however, this option was mostly a curiosity until the Macintosh II came along.

With the introduction of the Macintosh II, though, came Color QuickDraw. This version allowed multiple bits per pixel: 2, 4, or 8, allowing 4, 16, and 256 color settings per pixel, respectively. The predefined set of eight colors was dropped, and instead color lookup tables (CLUTs) were used. Each entry in a CLUT was 48 bits long, giving separate 16-bit values for the red, green, and blue components of that color. Entries were numbered from 0 to 2^N-1, and N equaled the number of bits per pixel. This gave a great deal of flexibility, but it was still limiting for high-quality graphics applications.

In 32-bit QuickDraw, Apple allows additional settings of 16 and 32 bits per pixel (though the former is rarely, if ever, used). In 32-bit mode, 8 bits each are allocated for red, green, and blue values, with an additional 8 bits that the 32-bit QuickDraw 1.0 documentation simply labels as unused. No purpose or function is given to these bits in the documentation. In fact, they appear to be a by-product of certain mathematical relationships that must hold in a PixMap (color bitmap) data structure, namely that the pixel size (in bits) must be a power of 2 (2, 4, 8, 16, 32, and so on) and must be greater than or equal to the combined size (in bits) of the color components (in the case of 32-bit QuickDraw, 8 + 8 + 8 = 24 bits). The fact that 32-bit QuickDraw supports 16-bit color strengthens the mathematical by-product argument; in 16-bit mode, 5 bits each are allocated to red, green, and blue, with a single unused bit left over. In both cases, the 32-bit QuickDraw documentation suggests that application developers be sure to set these extra bits to 0.

In all the Apple documentation relating to 32-bit QuickDraw, there is no mention of using these excess bits as an alpha channel. It's clear that, whatever the significance of the alpha channel, Apple hasn't been terribly concerned. The question is: should Apple be, and if so, why?

Graphic Composition

OK, what is an alpha channel, and what is compositing? How do they relate to each other, and why are both so important? To find answers, we

(continues)

need to go back to 1984, when a landmark paper was published in *Computer Graphics* (Volume 18, Number 3). "Compositing Digital Images" was written by Thomas Porter and Tom Duff, both of whom worked for Lucasfilm at the time. Duff and Porter were working on rendering complex computer-generated images (landscapes, still lifes, animation, and so on) and looking at mixing such images with video footage.

Their premise: It is simpler and better to render major elements of a given scene individually and then blend (or composite) them to generate the complete image. But this requires keeping information about the relative opacity—the degree of nontransparency—of each pixel in each element. This changes the usual triplet of values for a given pixel (red, green, blue) to a quadruplet by adding an "alpha" component with a range of values (0 to 255) equivalent to the other three. If normalized to a range from 0 to 1, an alpha value of 0 indicates complete transparency, while an alpha value of 1 indicates complete opacity. Values between 0 and 1 define degrees of translucence or transparency. The alpha values for all the pixels in an image were to be known collectively as the alpha channel.

In addition to describing the alpha channel concept and producing the requisite math for its implementation, Porter and Duff also introduced a set of *compositing operators*. These logical functions define the various ways that two images can interact when composited into the same graphic space. These interactions include putting one image in front of or behind the other, or mixing them together in various ways.

These techniques have widespread application in modern graphics and animation. Besides helping in constructing complete scenes out of separate graphic images, they also let you perform dissolves and fade-ins, mix video with computer-generated graphics, and do antialiasing to remove jaggies from lines and arcs for high-quality images.

Crunching Bitmaps

Given the power of the alpha channel concept, and its frequent use in high-end computer graphics, what are Apple's intentions? According to John Magill, Apple product manager for QuickDraw, Apple has no plans to do anything with the extra 8 bits. Instead, their use is entirely up to application and hardware developers.

That's fine, but it conflicts with Apple's own guidelines. A recent issue of *Apple Direct*, an Apple publication for developers, told developers, "Don't assume that you can use addresses, signal lines, or anything else that Apple makes as 'unused' or 'reserved.'" The article then went on to say, "The Macintosh needs room to grow, and things marked 'unused' or 'reserved' make that possible. If you use such items for your own purposes, you may be

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shooting yourself in the foot."

Such warnings notwithstanding, some developers are beginning to use the alpha channel, and the longer things go on, the harder it will be for Apple to retrofit alpha channel support to 32-bit QuickDraw. At this point, Apple is having enough trouble getting System 7.0 out the door; the company isn't about to launch a major effort to upgrade QuickDraw in this fashion.

Market pressures have also inhibited development of applications that might take advantage of the alpha channel. Because of the increasing competition between video hardware manufacturers, a number of Mac display boards now come equipped to support 24-bit color but not 32-bit color. A case in point is the Apple Display Card 8•24, which uses special memory-mapping circuitry to make 24-bit pixels look like 32-bit pixels (with the upper byte set to 0). The 25 percent memory savings isn't tremendous in and of itself; however, since it reduces the on-board memory required by the 8•24 to less than 1 megabyte, Apple can use less expensive components and less complicated addressing, lowering its costs.

Even so, there are third-party developers who do make use of the alpha channel in various ways. RasterOps, for example, uses it in the SFX video mixer to set up a linear key video mixer. With the SFX, you can blend incoming video images with Macintosh graphics, fading the graphics in and out or antialiasing the edges.

An Apple Composite

Engineers and product managers within Apple recognize the value and utility of compositing, but they face a real problem: backward compatibility. Apple has to support a variety of bitmap formats: the original 1-bit format; 2-, 4-, and 8-bit formats with 48-bit CLUTs; and 16- and 32-bit direct color formats. Furthermore, QuickDraw has to be able to convert images between all these formats. Therefore, any alpha channel information encoded in a 16- or 32-bit format would be lost in conversion to the other formats.

It appears System 7.0 may support some form of compositing via the CopyMask function. CopyMask currently lets a programmer combine an image with a *mask*—a one-bit-per-pixel bitmap—that either lets through or blocks each corresponding pixel in the image. The new CopyMask would accept masks with multiple bits per pixel. Such a mask would then be equivalent to an alpha channel, with each mask pixel indicating what percentage of the image pixel should come through. Also, Apple has indicated that this version of CopyMask would work with all bitmaps, not just those using direct color formats.

Alpha Done Right

Given this pending solution, does it really matter whether Apple does anything officially with the alpha channel? Perhaps. For an example of alpha done right, we just need to look

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at one potential competitor: Next (see "Next on the Agenda" in this issue).

From its initial release, the Next system software has supported and made use of the alpha channel and compositing functions. All displays at all bit depths have alpha channel support, with the channel itself ranging from 2 bits to 8 bits. As with the Macintosh, images of varying bit depths can be combined and displayed freely on the various displays. However, unlike on the Mac, all bitmaps can carry their alpha information with them.

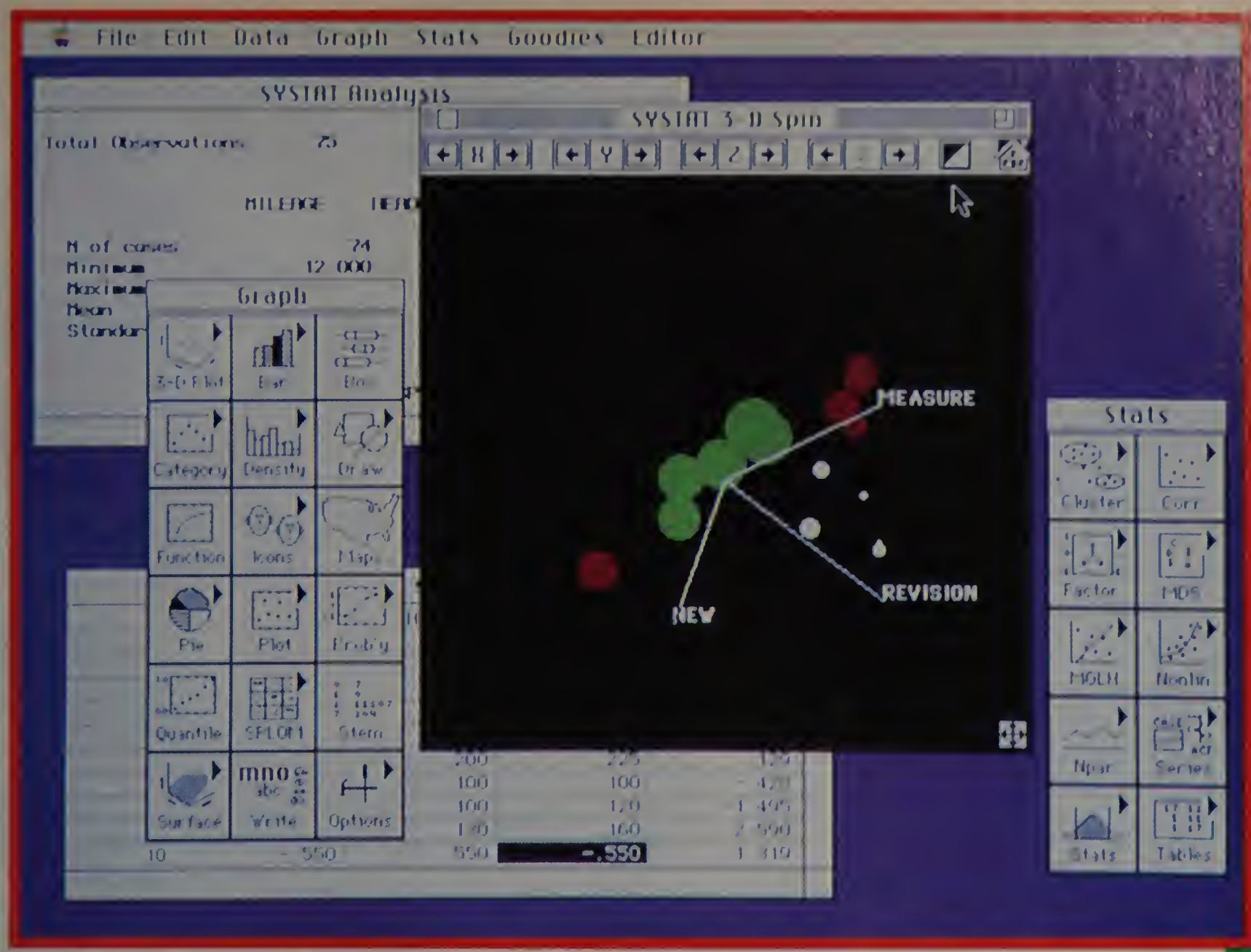
The results are impressive. Complex color graphical images can be layered and moved independently of one another, and can be quickly changed. Each graphical image can have transparent, translucent, or semiopaque portions, through which other images "behind" it can be seen to some extent. And a wide variety of special effects can be created using the 13 compositing functions built into the system software.

The Future

Apple's push, along with third-party firms, into 24-bit color, integrated video, image compression, and graphics acceleration demonstrates a seriousness in going after the high-end video- and graphics-workstation markets. In light of what Apple has accomplished, officials may not feel it is necessary to officially define the alpha channel. Apple may even be right—but the company stands to lose a lot if it's wrong. Next, Silicon Graphics, and others are all going after the color-workstation market with leading-edge technology and aggressive pricing, and Apple will need every advantage it can get.

The proposed CopyMask solution is necessary to maintain that competitive edge, but it may not be sufficient. Apple should exercise active technological leadership, with an eye toward long-term implications. All too often what you fail to see hurts you the most. ■

Contributing editor Bruce F. Webster is vice president of R&D at San Diego–based Pages, Inc. He can be reached via BIX (bwebster) and via MCI Mail (Bruce Webster).



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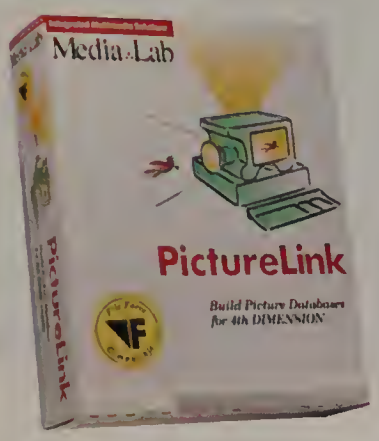

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Cobra 650e Hard Drive ..... $3250.

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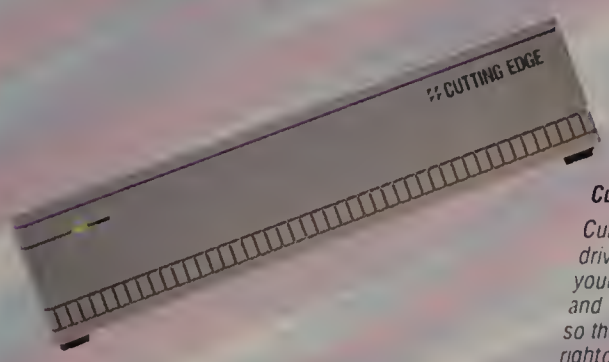

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- True BASIC Language 2.02 — 52.

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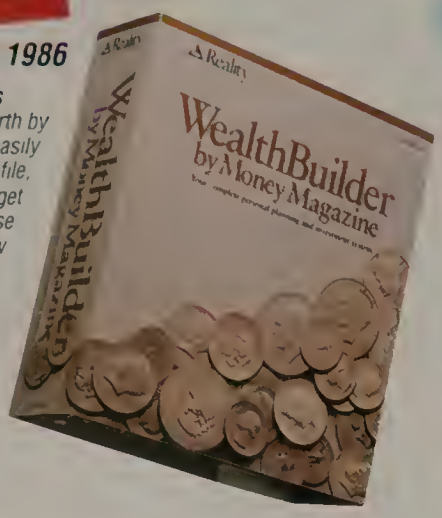

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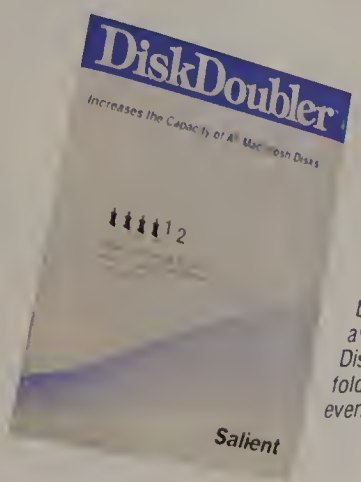

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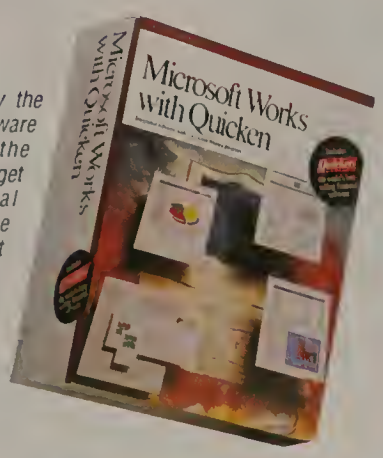

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Versa Term Pro 3.0 173.

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PhoneNet/AppleTalk Adapt. 8
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PhoneNET EN Mac II 350.
Mac II Card (10 Pk) 3,375.
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Star Connector EN 120.
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Star Wiring Kits-
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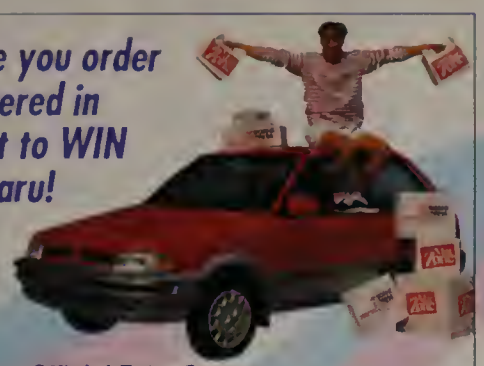

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MACWORLD NEWS

by Dan Littman and Tom Moran

The Collage of TV Knowledge

Radius recently demonstrated the Radius Video Collage Engine, a combination of hardware and software that gives the Mac II series most of the capability of high-end television editing systems. The proprietary technology developed by Radius supports multiple TV windows and very fast manipulation of 32-bit objects.

The basic Video Collage Engine system consists of a set of three NuBus boards that Radius will sell to developers only. The developers will add application software using the developer's tool kit also provided by Radius. The company expects that end users will use the technology for video presentations or for general video production at a much lower total cost than possible with currently available high-end professional video editing systems.

The first board of the Video Collage set is a video I/O controller that accepts NTSC or PAL video inputs and can display them on interlaced or noninterlaced monitors. Video Collage also includes two pixel processor (PxP) boards, each of which incorporates two very fast digital signal processor (DSP) chips that were custom designed for converting and manipulating television images. The system includes two proprietary DisplayBuses, which connect the boards to each other at a data-transfer rate of up to 135MB per second, much faster than the transfer rate of the NuBus.

Two-dimensional effects are calculated by the first DSP chip on each PxP board, while the second DSP processor provides up to 16 levels of transparency for overlays and for composite animations. The PxP boards perform zooms, rotations, and real-time antialiasing. Additional PxP boards can be used at the same time, with each contributing one 32-bit image plane. The 32-bit image planes can also be divided into two 16-bit image planes or four 8-bit image planes.

The developer's tool kit will be a set of libraries in C, Pascal, HyperTalk, and the X Object format for use with MacroMind Director. The Radius Video Collage Engine will be available to developers beginning in the fourth quarter of 1990. Its price will be set on a contract-by-contract basis, Radius said. For more information, contact Radius in San Jose, California at 408/434-1010.—**T.M.**

LUIS DELGADO

The Radius Video Collage Engine is a set of three NuBus boards that supports multiple TV windows as well as 32-bit image planes for sophisticated overlays and animations.

24-Bit Color Scanner Cuts Scanning Time

To reduce the time it takes to scan color images, UMAX has introduced the UC300, a 24-bit, three-pass color scanner that is faster than one-pass scanners. The UMAX scanner can scan an A-size image at 24 bits per pixel in less than four minutes. It can also scan at 3 bits per pixel or 12 bits per pixel in color, or 4 to 8 bits per pixel in gray-scale mode.

The UC300 scans one time each for red, green, and blue, using a different color filter over the light source during each scan. Despite the fact that it must make three passes over the image, the scanner is faster than one-pass scanners, according to UMAX,

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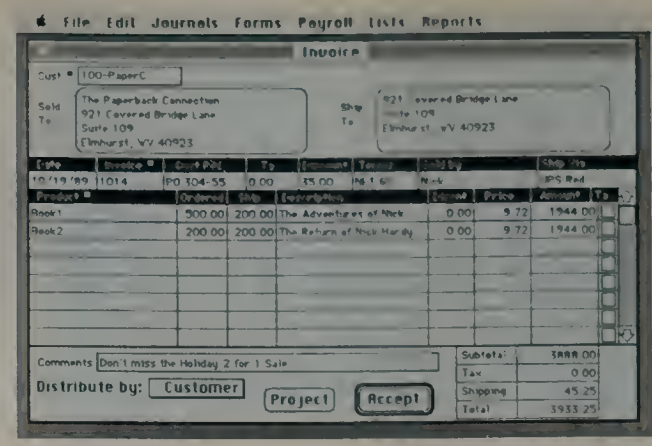

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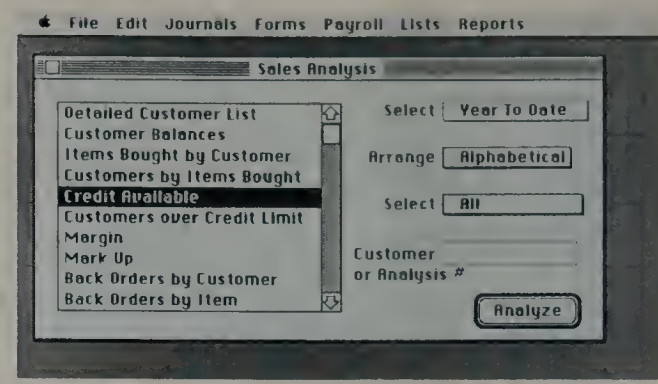

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ROBIN GINSBERG

The UMAX UC300 color scanner can scan a letter-size image at 24 bits per pixel in less than four minutes.

because the light source on one-pass scanners has to turn off and on 300 times per scanned inch. Since the light source takes a small amount of time to stabilize each time it turns on, one-pass scanners end up actually being slower.

The UC300 also adds a data buffer to improve its speed when working with a slow hard drive, limited memory, or a slow CPU. It has a SCSI port for connecting to the Mac; optional adapters are available for the IBM PC XT bus and PS/2 Micro Channel. The Macintosh version comes bundled with Adobe Photoshop. Now shipping, the UC300 for the Mac lists for $2495. For more information, call UMAX in Santa Clara, California, at 408/982-0771 or 800/652-0311.—**T.M.**

The Mac in Evolution

The California Academy of Sciences in San Francisco's Golden Gate Park has recreated the course of evolution as shown in the geological record—and is using Macs to exhibit the history of life. Near the entrance of the Life Through Time exhibit, a branching tree of lights guides visitors from a clay sculpture of the earth's layers to eight Macs depicting branching trees of biological lineage. On each Mac, interactive software traces the evolution of one of eight biological groups: bacteria, plants, arthropods, mammals, sea stars, mollusks, fish, and reptiles.

The exhibit, called LifeMap, is based on the theory of *cladistics,* which aims to reveal evolutionary links and to draw one complete map of life using *synapomorphies,* new anatomical traits appearing in biological ancestors that provide clues to the lineage of their descendants.

If you stop at the mammal station of LifeMap, you will see mammalian relatives on screen. A new lineage map will then appear to show you some of our extinct ancestors. If you click on a microscope between two ancestors, you will see pictures and text on their common features. Click on some of the creatures, and you will see new lineage maps leading forward in time. Keep clicking and you may arrive at chimps, humans, whales, cats, or hippopotamuses.

For an explanation of the classification *mammal,* click on the Science of LifeMap icon. A voice will tell you that a mammal is an animal with these new features: three middle ear bones to transmit sound waves; the ability to produce milk and suckle young; and hair for insulation.

Academy scientists and independent exhibition designers spent two years and $200,000 collaborating on LifeMap. They see it as a living textbook that they can expand as the study of evolution advances. It includes data from the scientists' own work, from scientific journals, and even from still-unpublished sources.

Apple donated the eight Macintosh IIcx machines used in LifeMap, and designers Chris Krueger, Amy Pertschuk, and Mark Charnow used Adobe Photoshop, Studio/8, Swivel 3D, a Barneyscan flatbed color scanner, and FilmMaker, Paracomp's interactive animation program. A CD ROM version of LifeMap is in the works for schools. For further information, contact Terrence Gosliner, director of research at the California Academy of Sciences, 415/750-7277, or Arborescence, a multimedia design firm, at 415/931-7415.—**Ann Garrison**

CAROLINE KOPP/C A S

Prehistoric beasts chasing each other across the evolutionary landscape in a scene from Life Through Time.

LUIS DELGADO

Light Source's MultiMedia Toolkit software lets the Mac control NEC's PC-VCR, a high-speed editing video recorder.

Software Links PC-VCR to HyperCard

Light Source has developed software that places NEC's PC-VCR high-speed editing VCR under Macintosh control and essentially adds the contents of the PC-VCR's tapes into HyperCard stacks. NEC has included the software, called the MultiMedia Toolkit, with the PC-VCR since October. Combined with the PC-VCR's ability to reach individual TV frames in a worst-case time of 2.5 minutes, the software will allow teachers or presenters to create interactive stacks that quickly access

(continues)

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images on ordinary VHS tapes. Using an NEC proprietary process, the PC-VCR adds frame-accurate timing and indexing to the tapes under the user's control.

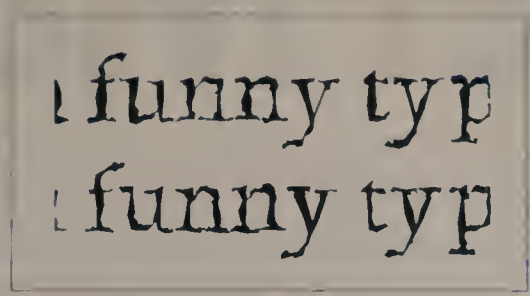
Light Source is also working on four other software modules for the PC-VCR, all of which should be available in January. The first of these, called the NEC Remote, puts the PC-VCR control panel's play, stop, rewind, fast forward, and record functions onto the Macintosh screen. It also can play preprogrammed video presentations. Another module, called Video Logger, creates a visual log of the beginning and end of user-selected segments of the tape, to help with editing. The third module under development, called the Video Sequencer, is a time-line editor that assembles logged segments in any order. The final module is TV Scheduler, which provides a graphic user interface for programming the PC-VCR to record broadcast TV shows. Users can type in the name, channel, and time of shows to be taped. TV Scheduler also lets users create small icons of different shows' opening frames for instant recognition. (This process requires an image-capture board, available from a number of Mac hardware developers.)

NEC's PC-VCR has a list price of $2100 and is available now. For more information, contact NEC in Wood Dale, Illinois, at 708/860-9500.—**T.M.**

Random Notes from Type90

What happens when more than 500 type experts get together? If Type90, held this fall in Oxford, England, is any indication, everything from a seminar on legal protection for typeface designs to a lecture on Holland's chocolate holiday alphabets ("we no longer care about legibility; edibility is what concerns us here").

Two Dutch designers, Erik van Blokland and Just van Rossum, went beyond chocolate, liberating Macintosh type users from smooth, consistent fonts with a unique technology called RandomFonts. The two hacked the code in the PostScript font Beowolf to make every occurrence of each letter assume a slightly different shape. Letters take on still different shapes each time the document they're in is printed, which makes for some interesting auras in four-color separations. Three versions of Beowolf have increasing levels of randomness: Beowolf 21 changes only slightly, Beowolf 22 produces some pretty ragged copy, and Beowolf 23 borders on chaos. If your desktop published documents are looking a little too nice lately, it might be time to add some randomness to your life. Pricing for Beowolf was not set at press time. For more information, contact the FontShop in Toronto at 416/348-9837.—**Erfert Fenton**



Desktop typography takes a turn for the weird with a self-randomizing font.

Serius Reaches for the Stars

After laboring quietly for years on an object-oriented programming system, Serius is stepping out with technology unlike anything yet seen on the Mac. Serius Business is a multiuser database shell, an object developed in the Serius programming system, that is designed to incorporate other Serius objects. The first version includes a 12-dimensional spreadsheet that users operate with natural language. Later, Serius will release objects for executing HyperCard XCMDs inside Serius Business; for talking to mainframes; and for generating reports; and a point-of-sale object for running cash registers, operating an inventory database, and so on.

The database shell stores worksheets as records and can retrieve them using complex Boolean search queries that look at the cell contents of worksheets in the database. You could request all the worksheets developed by three colleagues that examine 1970 and/or 1980 census information on income for Oregon, Washington, and/or California; it would find them even if they were saved as worksheet #1, #2, and #3.

A multidimensional spreadsheet is a difficult concept to grasp. If your colleagues had collaborated on a single worksheet (Serius worksheets are multiuser and can lock at the cell-range level), they might have set up one kind of data, such as age groups, in columns; a second kind of data, such as income levels, in rows; and a third kind of data, such as states, in stacked planes. The next dimension, though we can't visualize it, might be census years. Serius can slice through dimensions to show you any two in a table format; and you can display information in a wide variety of 2-D and 3-D graphs, and incorporate an extra dimension by animating graphs. Natural language simplifies extracting data and using it in formulas, which would be overwhelming if you were using standard column-and-row number conventions.

The spreadsheet object provides a macro language that may not impress Excel or Wingz hackers but can automate most basic functions like opening worksheets or comparing ranges. For very complex programming tasks, users would turn to the Serius environment.

(continues)

GRANT HEATON

Serius people (from left): head programmer Joe Firmage (a day shy of 20); Gaye Wright, Ed Firmage, Matt Nielson.

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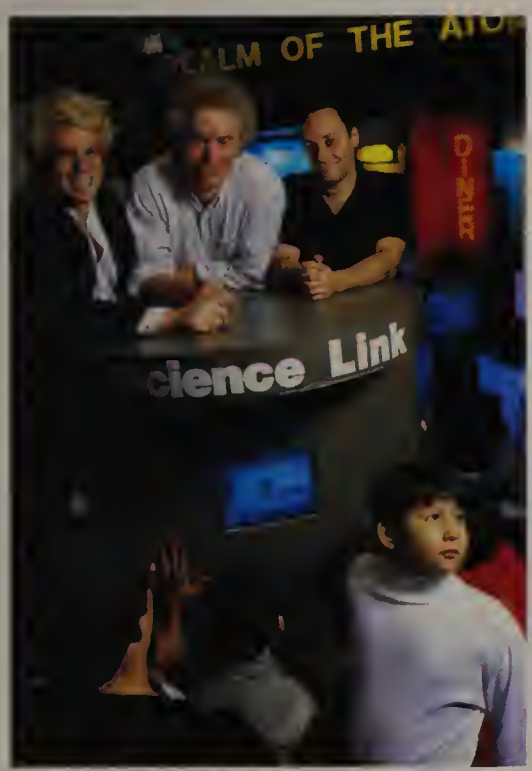
Serius Business is somewhat like Muse, a natural-language database currently under development by Occam Research, and more like Lotus Improv, a multidimensional spreadsheet that Lotus is writing for the Next machine and will probably port to the Macintosh. But Muse is a database, not a shell for handling other data-manipulation objects, and Lotus Improv's first version is bereft of programming tools. The Serius Business shell with the spreadsheet object will list for $395. For more information, call Serius in Salt Lake City, Utah, at 801/272-7788.—**D.L.**

Designing a Public Interface

When germs invade a human body, macrophage cells rush to eat them, and T-helper cells signal B-cells to produce antibodies that attack the surviving invaders. It's a silent battle—except in the New York Hall of Science's Mac II–based multimedia exhibit, The Human Immune System. There, macrophages' jaws chomp on germs out loud, T-cells sound an alarm bell, B-cells bleep as they produce antibodies, and antibodies attack with a short, sharp zing.

Without sound and high-resolution color graphics, The Human Immune System might have a hard time competing for attention in the Hall of Science, a 25,000-square-foot building filled with 135 exhibits and a multitude of children and adults. At the start of the project, biology director Sam Taylor, programmer Jeff Jones, and graphic designer Paul Zelevansky knew they had to create what they call a public interface—different from an interface designed for an adult working alone in a quiet setting.



VIRGINIA LIBERATORE

Science exhibit designers (from left): Jeff Jones, John Driscoll, Paul Zelevansky.

The value of the sound effects became clear during early testing on the museum floor, when visitors said they could recognize macrophages, T-cells, B-cells, and processes like cell multiplication upon hearing their distinct sounds.

The design team reached several conclusions that may be helpful for anyone who is designing for similar environments:

- Families often look at the exhibit together, so exhibits need enough pictures, colors, and sounds to engage children and enough depth to engage adults.
- Museum-goers learn to use trackballs easily.
- Many people listen to the optional narration.
- Users comprehend an exhibit more quickly when groups can squeeze in together and talk about it.
- Finally, the interface must be very easy to use, and that means you should design buttons rather than menus.

The Human Immune System is part of the Hall's growing collection of NYNEX Foundation–funded multimedia exhibits collectively called Science Link. The first interpreted color and light phenomena, and the next will educate about AIDS. For further information, contact John Driscoll, Manager of Arts and Technologies, New York Hall of Science, 718/699-0005.—**Ann Garrison**

This Flat Earth

Native Americans in the United States and Canada will soon deploy a new weapon in their fight to regain control of land whittled away by centuries of treaties. With help from the Solidarity Foundation, a New York–based research organization, Indians will go into the courts and government agencies with accurate historical and thematic maps developed with Strategic Mapping's MapMaker. The Foundation is busy digitizing maps from a collection at the Smithsonian Institution's Bureau of Ethnography; the collection was drawn by Charles Royce in the mid- to late-1800s and shows all treaty boundaries from the colonial period through the late nineteenth century.

(continues)

VIRUS WATCH

Current viruses, Trojan horses, and worms affecting the Macintosh community.

ANTI-B (aka ANTI-ange)

Type: Virus
First listed in Virus Watch: 1/91
Info: A buggy predecessor of the original ANTI virus; infects applications.
Impact: Nondestructive; can cause crashes.

CDEF

Type: Virus
First listed in Virus Watch: 12/90
Info: Infects Desktop file
Impact: Nondestructive; can cause crashes.

MDEF2

Type: Virus
First listed in Virus Watch: 12/90
Info: An MDEF (Garfield) clone
Impact: Nondestructive; can cause crashes; infects both System file and applications.

Steroid

Type: Trojan Horse
First listed in Virus Watch: 10/90
Info: Steroid is a disk-destroying INIT circulated with the false claim that it speeds up QuickDraw on Macs with 9-inch screens.
Impact: Destructive.

Note: the recent warning in Virus Watch of a PostScript hack that disables printers appears to have been a false alarm.

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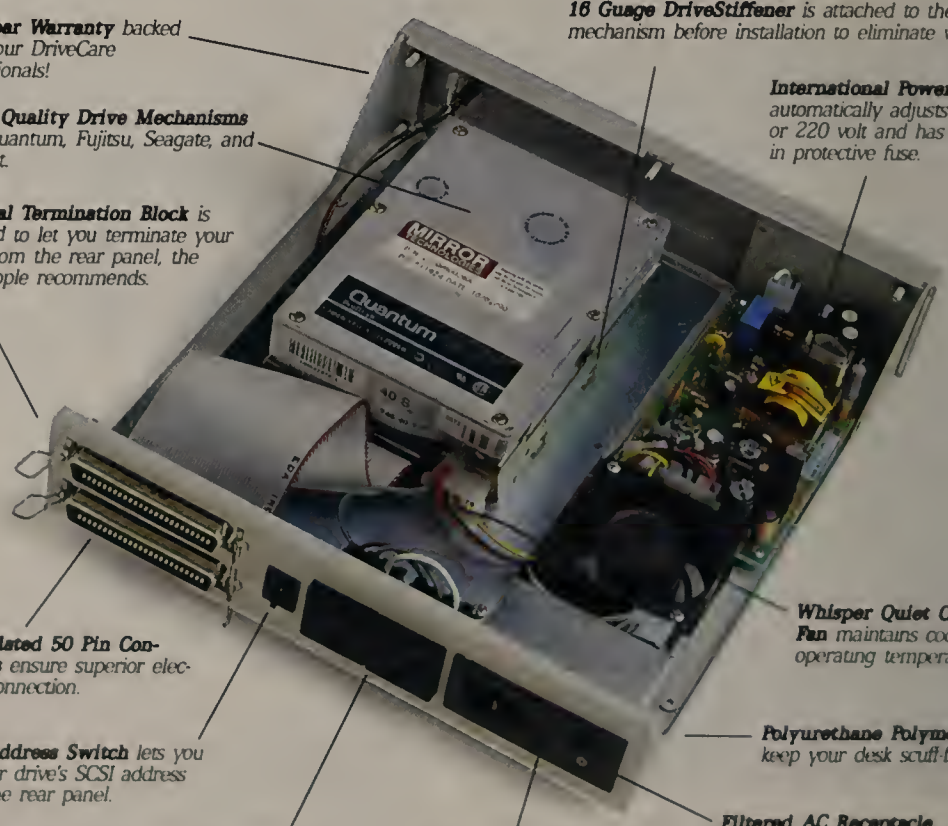

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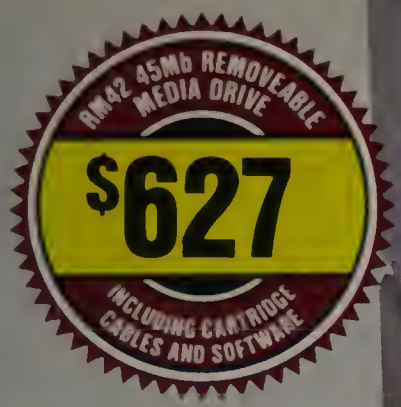

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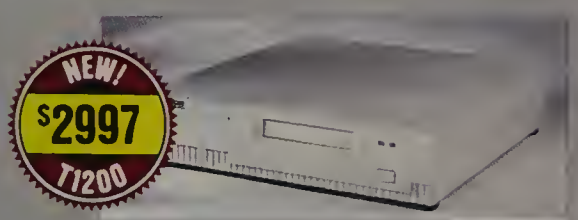

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M45(s)	45Mb	$327	$ 417
M45(f)	45Mb	$367	$ 447
M80(s)	80Mb	$447	$ 497
M80(q)	80Mb	$597	$ 647
M90(f)	90Mb	$527	$ 597
M105(q)	105Mb	$647	$ 697
M130(f)	130Mb	$747	$ 797
M180(f)	180Mb	$847	$ 897
M325(f)	325Mb		$1797
M650(f)	650Mb		$2297
RM42	45Mb		$ 627

(s) = Seagate, (f) = Fujitsu, (q) = Quantum

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CHASE ROE

Cree Indians (shown here in New York Harbor) are using computer-generated maps to press territorial claims.

Map vectors traced on a Summagraphics tablet are imported into a 4th Dimension database and converted to latitude and longitude. When the database is complete, the information will be overlaid on MapMaker maps to demonstrate shrinking reservation boundaries, curtailed fishing and hunting regions, gerrymandered land values, or places where proposed coal mines or nuclear waste sites overlap residential or sacred lands.

MapMaker is not a full-featured geographical information system (GIS), lacking (among other essentials) an underlying relational database, so it is most suited for displaying data as overlays on a map. Version 4.5 incorporates a number of new features including a command language that can read and execute commands and map parameters written to the Clipboard by programs like HyperCard and Microsoft Excel; the ability to display different layers at different heights—for example, municipality boundaries at 30 miles above the earth and streets at 1 mile up; and support for point locations (for example, street intersections).

Strategic Mapping plans to develop a Macintosh version of its full-featured IBM PC–compatible Atlas GIS. Atlas GIS has a dBase III–compatible database, making it possible to perform relational searches across multiple files and then map the results. For example, with Atlas GIS (and all the necessary data) you could generate boundaries of an area affected by a toxic chemical spill, extract a telephone list of residents to be evacuated, and generate road maps showing projected traffic jams at highway entrances in the evacuation zone.

MapMaker 4.5 ships with several databases of boundaries and census information and lists for $495. Atlas GIS lists for $2500 (the Macintosh version will probably list for the same amount); no ship date for the Mac version is projected. In addition, Strategic Mapping resells a wide variety of geographical information. For more information, call Strategic Mapping in San Jose, California, at 408/985-7400.—**D.L.**

Here's Talking to You

Al Jolson said it best: "You ain't heard nothin' yet, folks." Now Macs with Interface Agent and a microphone will be saying it—saying something, anything—just about nonstop.

Interface Agent is a collection of utilities that use speech in ways ranging from the silly to the almost essential. The utilities incorporate synthesized (Macintalk) speech and digitized (recorded) speech in many activities. For example, Chatter is an agent, similar to Talking Moose but with a talking, blinking, wiggling human head, that pops up occasionally to make irrelevant remarks (a script editor is available for teaching it new phrases). Hello/Goodbye is another agent, which greets you when you turn on the Mac and says good-bye when you shut it down; MailReader is an add-on to Microsoft Mail that reads your mail aloud.

In the more-useful category is Message Center, which uses the microphone to sense when someone enters your office and offers to take a written or spoken message; and InterCOM, which turns Macs into an intercom system, so you can send a spoken comment down the network and have it play on someone else's Mac (both parties must have InterCOM installed).

Interface Agent will probably list for $149, and InterCOM ten-packs will sell separately for about $100. For more information, contact Bright Star in Bellevue, Washington, at 206/451-3697.—**D.L.**

Ethernet Board Links Mac IIsi to Networks

Asante Technologies has designed an Ethernet board small enough to fit directly into the slot in Apple's new Macintosh IIsi, enabling users to add the relatively inexpensive Macs to their Ethernet networks. Describing its MacCon+ 30i as the smallest Ethernet board ever developed, Asante said that other Ethernet adapter boards designed for the SE/30 slot or for NuBus require an extender board from Apple and therefore cannot fit into the small space inside the Mac IIsi system box. The Asante MacCon+ 30i board does not need an extender board and measures only 2.7 inches high by 5.1 inches wide.

The Asante Ethernet board comes in two versions, the MacCon+ 30i E, which comes with connectors for both thin and thick Ethernet cables, and the MacCon+ 30i ET, which gives users connectors for both thick Ethernet and 10BaseT (twisted-pair wire) Ethernet. Both versions of the board have a suggested retail price of $495 and are currently available.

(continues)

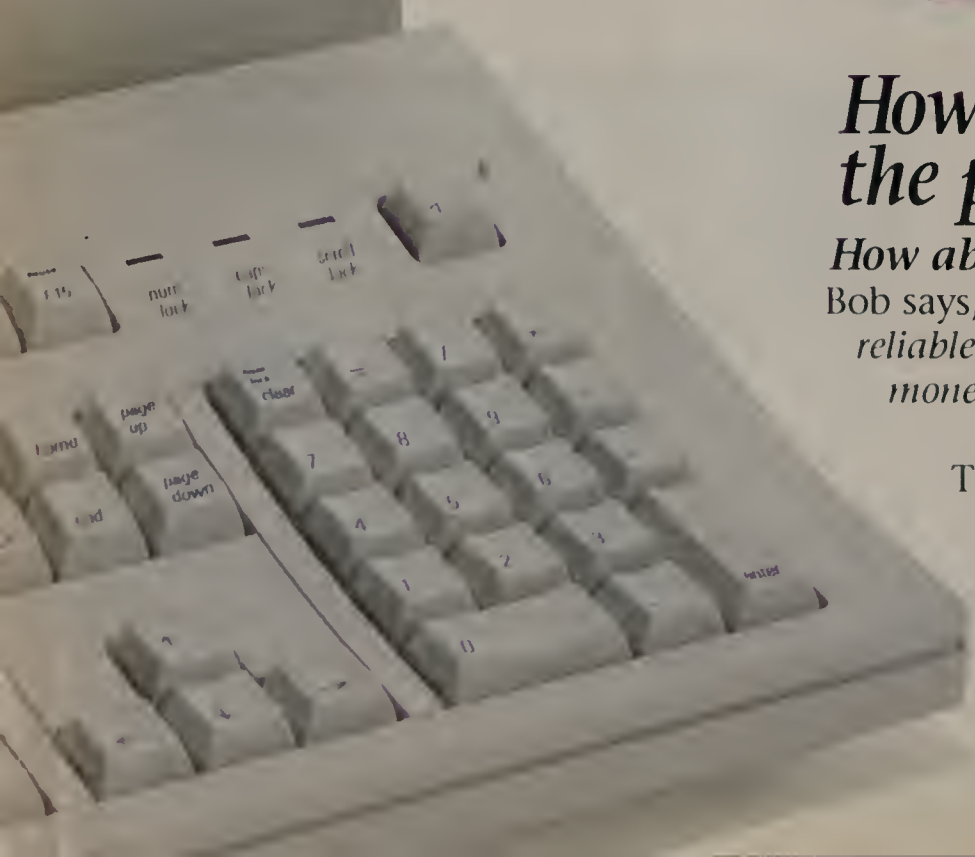
Interface Agent can make networked Macs into an intercom system or take messages when you're out of the office.

MacAvenue's Protegé

. . .Dr. Macintosh That is

MacAvenue's Protegé drives meet the most demanding performance expectations. Want a second opinion? Listen to one of the most demanding Mac users, Bob ***"Dr. Macintosh"*** LeVitus, the guy who wrote the book on mastering the Macintosh.

Bob LeVitus, author of Dr. Macintosh, *recommends the Protegé drive.*



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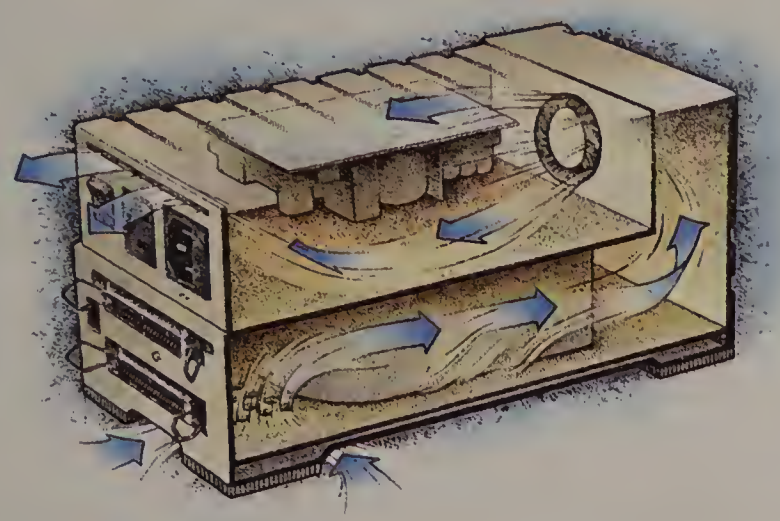

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For those who are in the market for monitors there are a couple of choices. If you don't mind spending money on expensive labels, buy your next monitor from Apple or Radius. But, if you prefer saving money, call Ehman.

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Circle 144 on reader service card

JOHN WILLIAM LUND

Asante Technologies' MacCon+ 30i is an Ethernet board that plugs directly into the Macintosh IIsi's single slot.

Asante is also shipping an optional 64K buffer that lists for $50. For more information, contact Asante Technologies in Sunnyvale, California, at 408/734-4844.—**T.M.**

All You Can Print for $179.95

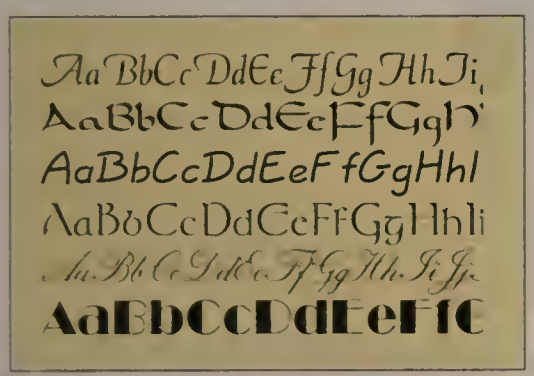
Casady & Greene's designers and programmers have been hard at work revamping the company's old fonts as well as creating new ones. The result: Fluent Laser Fonts version 4.01. The version 4.01 fonts feature several improvements over earlier versions from Casady & Greene.

The new releases are all in Type 1 format, which makes them compatible with Adobe Type Manager. And many of the new fonts have been completely reworked to refine outlines, add hints, and to include fi and fl ligatures.

And although the quality of the fonts has gone up, the price has gone down. A new marketing strategy, which Casady & Greene calls the Fluent Laser Font Library, offers 21 of the company's first volumes (79 fonts in all, counting different styles and weights) for $179.95—not a bad price, considering the fact that the original volumes sold for $89.95 apiece.

In addition to the decorative, display, and script fonts in the Fluent Laser Font Library, Casady & Greene has 13 new volumes that include calligraphic, display, and music notation fonts, Cyrillic character sets, and a series of fonts for publishing computer documentation. The documentation fonts provide Key Caps, buttons, special characters, and symbols. The new volumes range in price from $69.95 to $130.

For further information, contact Casady & Greene in Carmel, California, at 408/624-8716 or 800/359-4920.
—**Erfert Fenton**



A selection of fonts from Casady & Greene's Fluent Laser Fonts version 4.01.

The PostScript Etch A Sketch

Nearly 25 years before MacPaint there was Etch A Sketch. When the Macintosh arrived on the scene, Etch A Sketch aficionados were quick to note the similarity between their toy and the Mac. In fact, furniture-maker John Goodman (a card-carrying member of the official Etch A Sketch Club) went so far as to merge the two. Using software of his own design and about $100 worth of circuitry, he's put the "magic screen" to work in his Cambridge, Massachusetts, woodworking shop.

Goodman has experimented with Fontographer, The Art Importer, and Letra-Studio to convert SuperPaint and Illustrator designs into fonts, which he then translates into a format the router can use to cut veneers for his wood-inlay work. He hopes to use Fontographer's Expand Stroke function to help compensate for the router bit's natural offset. Goodman uses the Etch A Sketch essentially as a plotter, to test his patterns before committing them to wood. Apart from replacing the knobs with stepper motors (which drive the drawing mechanism) and seating the motors in ball bearings, he left the Etch A Sketch intact. The old constraints apply: drawings are continuous lines, and erasing means picking the thing up and shaking it. With PostScript and the responsive stepper motors, the Etch A Sketch has the equivalent of 144-dpi resolution.

Goodman has no commercial plans for his unnamed system.
—**Marjorie Baer**

BILL O'CONNELL

John Goodman in his Massachusetts woodworking shop, showing off the world's only PostScript Etch A Sketch.

Corporate Data Commando

Corporate executives are faced with an ever-increasing flood of information that they must assimilate to make strategic planning decisions. An Executive Information System (EIS) is easy-to-use software that gathers, filters, and organizes the torrent of data into useful form, letting executives access and manipulate information from corporate databases and online information

(continues)

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Circle 188 on reader service card

JIM FLANIGAN

At Du Pont, Bob White manages Executive Information Systems, including Commander.

services with only a mouse or a touch screen.

Comshare recently introduced Commander EIS 2.1, which adds Macintosh and OS/2 support to the company's existing DOS product. Commander EIS is a tool kit for constructing corporate EISes to run on local personal computers and on IBM or DEC mainframes. The mainframe software, called the Executive Information Base, makes data from SQL, DB2, Oracle, and other databases accessible to the Macintosh. Software on the Mac is used for creating new Commander applications and interfaces, communicating with the mainframe, and programming applications in HyperCard and SuperCard.

The heart of Commander is the Briefing Book and Execu-View. Briefing Book gives the executive a customizable overview of corporate performance with color-coded text and graphs. Clicking on a loss figure in red brings up the supporting information for that figure. Execu-View lets the executive set up sophisticated financial models and look at data from different perspectives by simply clicking on the screen. Commander also has electronic mail; a reminder function; and News Navigator, a graphical interface to Dow Jones News Retrieval. Commander can be configured by each user to display only the information that person needs; clicking on the data zooms in for more detail.

Commander EIS prices run from $70,000 to $356,000, depending on the mainframe configuration and the number of users. The workstation software is $1500 and requires a color Macintosh with 4MB of RAM and a hard drive. For more information, contact Comshare in Ann Arbor, Michigan, at 313/994-4800.

—Tom Negrino

C-Cube Ships Image-Compression Board

C-Cube Microsystems has begun shipping Compression Master, a combination of a NuBus board and software that can compress 24-bit still images down to 1/80 of their original data size in order to save storage space. The board includes C-Cube's CL550 compression processor chip, which is based on the international JPEG compression standard.

The software provided with the board is DiskDoubler Plus, a new version of DiskDoubler from Salient Solutions. When using DiskDoubler Plus, you can preview the effects of various compression ratios on different areas of the image. Once you're satisfied that a given compression ratio will not unduly degrade the image, you click to compress the file at that ratio. DiskDoubler Plus does not currently allow the user to select different compression ratios for different areas of the same image. The CL550 can support that capability, however, and future software is expected to implement it.

C-Cube also announced its Image Compression Interface (ICI), a proposed interface standard for compression systems using its processor or other JPEG-based compression processors under development. Compression Master began shipping in late October. Its suggested list price is $995. For more information, contact C-Cube at 408/944-6300.—**T.M.**

TOM GIBSON

C-Cube's Compression Master board and software can shrink a 24-bit image file to as little as 1/80 of its original size.

Motorola Offers Secure Voice/Data Phone

For organizations worried about the privacy of phone conversations and data transmissions, Motorola has designed the Sectel Secure Telephone Terminal series. The Sectel devices look and operate like full-featured handset/speaker phones with a wide range of autodialing and other conventional office-phone features, but they also include fax and modem capabilities and a number of security options. Both the Sectel 2500 and the Sectel 3500 offer a choice of government STU III–compatible encryption or Distributed Key Certification System encryption. Both phone models require physical keys to access the secure features of the phone. The Sectel 3500 has a few other features including additional synchronous data-transmission modes.

A large LCD panel on the base of the phones lets you know the security status of the device. The Sectel's modem operates at up to 9600 bps, and the phones are also compatible with devices that send video still-frames. Voice and data can both be encrypted, and simultaneous voice/data transmission is possible at 2400 bps for voice and 2400 bps for the data.

However, all this safety does not come cheap. The Sectel phones sell for about $4000, and that's just for one. The Sectel 2500 and Sectel 3500 began shipping in late August. For more information, contact Motorola Secure Telecommunications at 800/747-3330.—**T.M.**

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Adding memory doesn't require technicians in lab coats. Just open your Mac, slide out the main circuit board and plug in your SIMMS. Our FREE video will give you STEP-BY-STEP installation instructions. Every type of Mac is covered and we think we've made it a breeze.

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The chart explains exactly what you need to achieve the desired level of performance.

To upgrade a 4-socket Mac Plus or SE to this amount of memory.	Do this: (Install in multiples of two only)
2 MB	Remove all four existing 256K SIMMs, install two 1 MB SIMMs, leave two sockets for future expansion.
2-1/2 MB	Remove only two 256K SIMMs, install two 1 MB SIMMs.
4 MB	Replace all four 256K SIMMs with four 1 MB SIMMs.
To upgrade an 8-socket Mac II, IIx, IIcx, oe SE 30 to this amount of memory.	**Do this: (Install in multiples of four only.)**
4 MB	Remove all four existing 256K SIMMs, install four 1 MB SIMMs, leave remaining sockets for future expansion.
5 MB	Keep existing 256K SIMMs, install four 1 MB in remaining sockets.
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Do you need 80, 100 or 120 Nanosecond (ns) chips? Nanoseconds are billionths of a second, so an 80 ns chip responds faster than a 100 ns chip. The original Mac used relatively slow 150 ns memory chips. The 68020 processor reads 120 ns (or faster) chip, and the 68030 Macs like the speedier model.

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MWA1P

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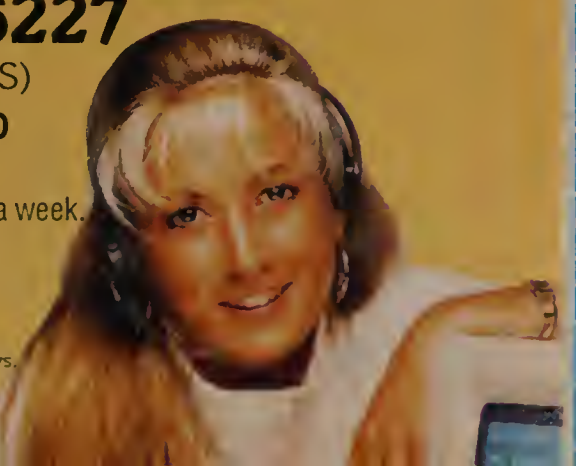

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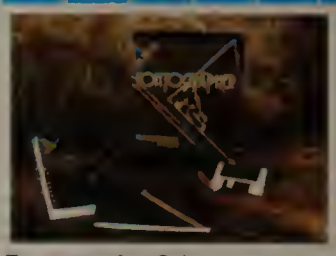

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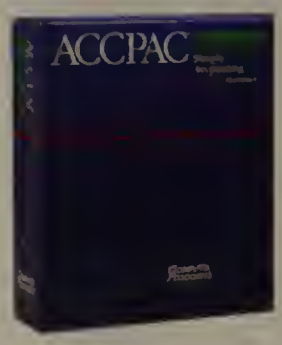

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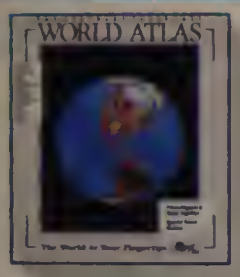

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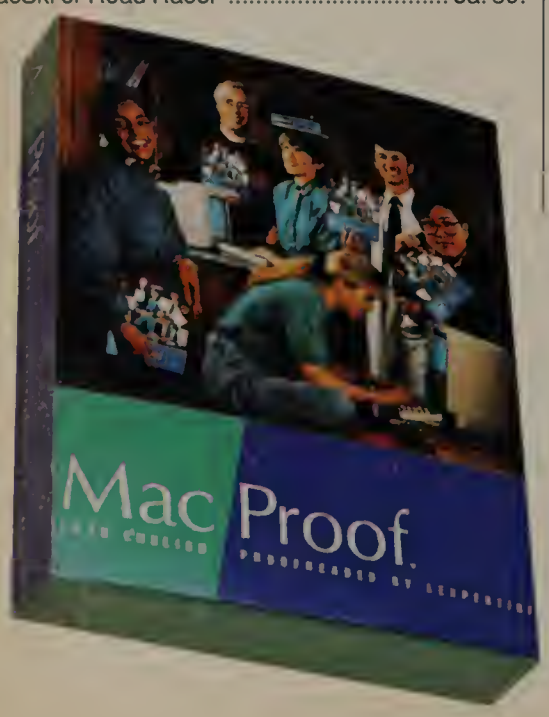

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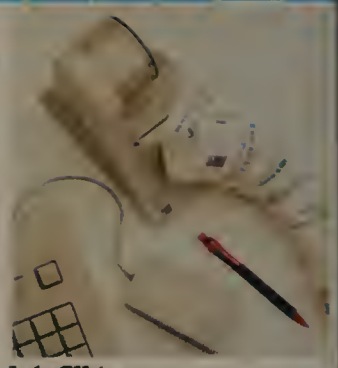

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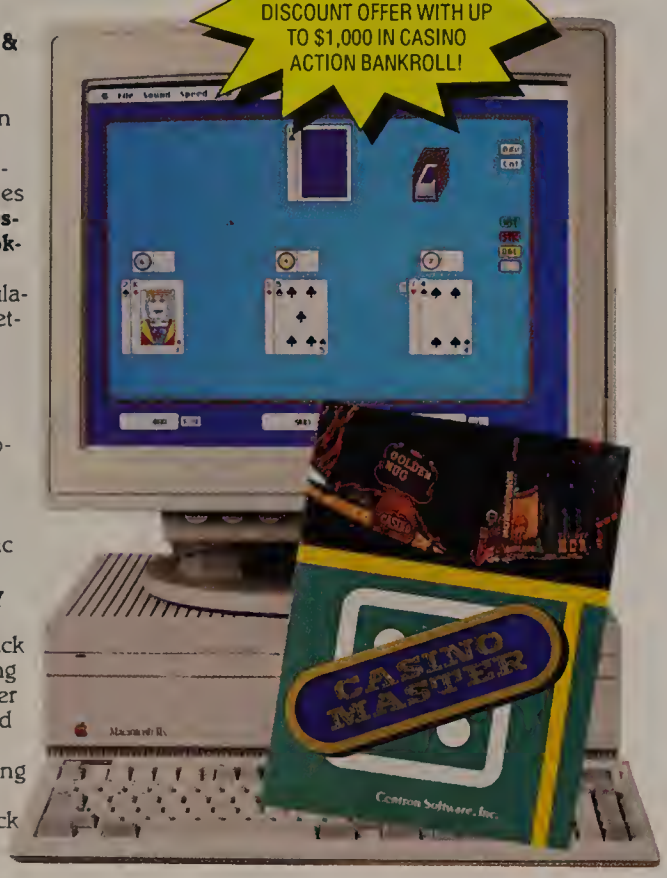

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Intersect CDR-35 ..... 399.
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Seikosha Printer (dot-matrix) ..... 235.
Sharp (full line available)
The Wizard - 7000 ..... 219.
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ThunderWare
LightningScan 400 ..... 385.
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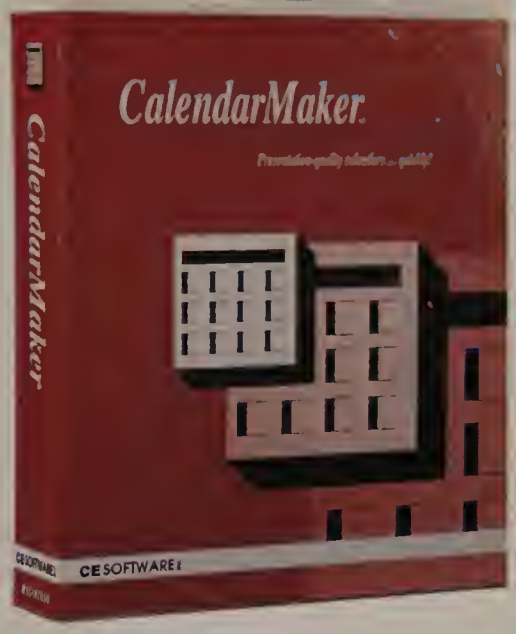

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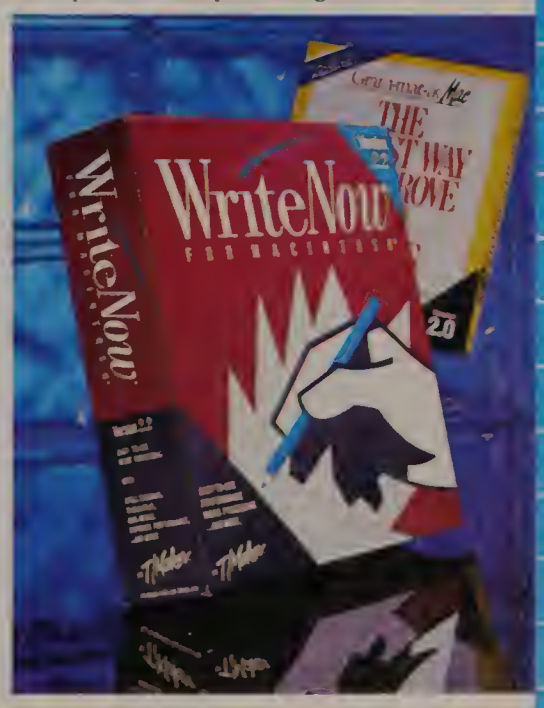

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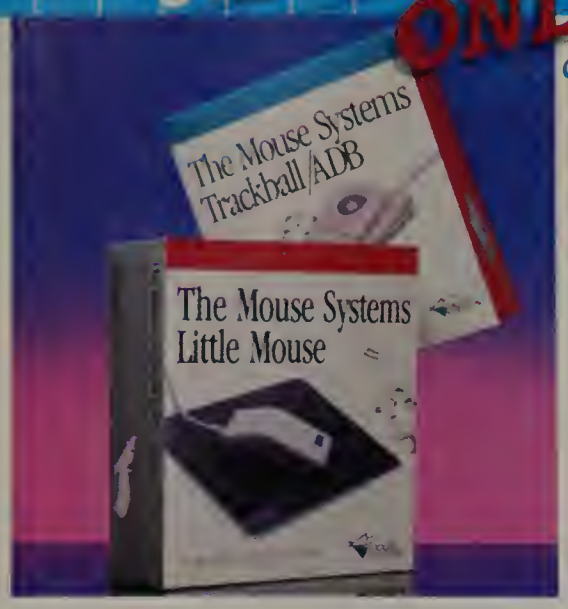

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LYNX Turbo Trackball ..... 59.
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MacTrac DB9 ..... 62.
Micro Touch
The UnMouse ..... 189.
Mouse Systems
TrackBall ADB ..... 69.
Little Mouse ..... 75.
Practical Solutions
Mouse Master ..... 39.

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Smalltalk/V MAC ..... 125.
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MaxFax ..... 309.
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Symantec Corporation
S. A. M. ..... 67.

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OmniDraft ..... 69.
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Mac Tools Deluxe ..... 75.
Custom Applications
Freedom of Press 3.0 ..... 255.
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THE BIG SQUEEZE

As images get bigger, compression issues loom larger still

BY CHARLES SEITER

You may have noticed that you are running out of hard drive space. And while the pages of *Macworld* are filled with storage solutions—bigger, faster hard drives; tape backup units; erasable optical drives; write-once, read-many (WORM) drives; and everything else that stores hundreds of megabytes of data—even those solutions can seem inadequate when you work with a scanner.

Scan several color or gray-scale images larger than a few square inches in area, and you can fill a 100MB hard drive in less than an hour. Furthermore, the sizes of these image files (ranging anywhere from 400K to several megabytes) are such that you can send them to other people only by mailing a disk. Use a modem to transfer those files? Perish the thought.

People have had data-bulk problems for years. Satellite telemetry is a prime example—imagine the mass of information involved in sending back big colorful pictures from Neptune. Now that storage problems have come down to earth, the busy wheels of commerce have started spinning out solutions.

In fact, several developers are adapting for the Macintosh a variety of solutions to the problems of image compression and decompression. Now, almost a year after *Macworld* explored the first efforts in this area (see "State of the Mac," *Macworld,* April 1990), several technologies and products are, or will soon be, available to developers and end users who must deal with large image files.

Currently, there are two approaches to image compression and decompression on the Mac. The first approach is strictly software-based—special programs that run on the Mac to compress and decompress images. (Developers can use special tools to add image compression and decompression to existing applications.) The second approach combines hardware and software, taking advantage of special accelerators that execute the compression and decompression cycle on large files in seconds—not minutes.

Compression, however, doesn't mean the same thing in all cases. Because of the different information they contain, text files, line-art files, and files of continuous-tone images must utilize different compression schemes. As a result, you should think about the types of files you work with as we examine different squeezing methods.

Squish!

Let's start off with how basic, everyday text files get compressed. Examine a standard text file and you realize it's composed of characters and perhaps some invisible formatting code. Each character can be represented as an

HUFFMAN ENCODING

the sample you see here is fairly standard

Character	Quantity	Code
(space)	7	000
e	6	001
a	4	010
s	4	011
r	3	11000
t	2	11001
h	2	11010
l	2	11011
i	2	11110
d	2	11111
y	2	100000
f	1	100110
m	1	100001
n	1	100010
o	1	100011
p	1	100100
u	1	100101

In ordinary text compression, frequently occurring characters or sets of characters are replaced with codes shorter than the usual 8 bits.

Unencoded = 366 (42 char. x 8 bits)
Encoded = 187

ASCII byte, and each byte takes 8 bits of space in the file.

Huffman encoding, the simplest compression scheme, uses a very straightforward principle: replace symbols with codes of varying lengths. The more frequently a symbol is used, the shorter its code. Rarer symbols get longer codes. If, for example, the symbols are letters, *e, t, a,* and other commonly used letters might receive 3-bit codes and *j, z,* and *q* might receive 8-bit codes. While some variations of Huffman encoding use ready-made symbol-frequency tables, others fabricate a special table for each file based on statistical analysis (see "Huffman Encoding").

Naturally, Huffman encoding also ensures that there's a way to decode symbols. That information is necessary because the coded symbols have varying lengths, unlike uncoded symbols, which are always 8 bits long.

Lempel-Ziv (LZ), or *Lempel-Ziv-Welch* (LZW), is another redundancy-based compression scheme. Instead of coding each symbol, LZ replaces frequently used symbol strings with fixed-length codes. There might be one code for *that,* another for *and,* and yet another for *there,* while names or other words that occur only once remain uncoded. LZ software scans a file of text, symbols, or bytes representing graphics and performs statistical analysis to create its table of codes.

By replacing 60 to 70 percent of the original text with symbols that are at most half their original length, a compression of 50 percent or so results. You get less impressive results compressing applications (perhaps 10 to 20 percent compression), because the compiled hexadecimal code of an application exhibits nowhere near the redundancy of English-language text. Database files are another difficult case: records of names, addresses, and phone numbers seldom repeat, cutting down on their compressibility.

Monochrome PICT files, on the other hand, compress fairly well. They are often quite redundant—full of white space, for example. Gray-scale and color images can also be compressed by Huffman encoding methods, but with less success than monochrome files.

Most Macintosh users are familiar with general-purpose compression utilities. Aladdin Systems' StuffIt Classic and StuffIt Deluxe and Bill Goodman's Compactor are popular examples. Such programs are used primarily to compress several files into one archive file.

Another compression utility, Salient Software's DiskDoubler, acts as more of a disk extender than as an archiver. Double-clicking on a compressed file automatically launches its creator application and expands the file; similarly, when you save the file and quit the application, DiskDoubler automatically recompresses the file.

Document Squeeze Play

You may not have considered it before, but the ubiquitous fax machine is based on image compression. If the 200-dots-per-inch image of your 8½-by-11-inch sheet of paper were not compressed, it would fill 4MB of memory and take nearly an hour to transmit at 9600 bps. Clearly this doesn't happen, so it's fair to ask what compression tricks faxes use.

The most popular faxes (Group III faxes, as defined by the International Consultative Committee on Telegraph and Telephone, or CCITT) use an internal statistical table to encode the image of the page. Instead of using the frequency of characters and character combinations, the statistical table uses the frequency of black- and white-line lengths.

For example, the most frequent line image in business correspondence is simply 8½ inches of white space, so there's a short code for "blank all the way across." The receiving fax decodes that code and skips a line.

Lines with more content, meanwhile, are encoded as lengths of black and white spaces. If you look at a typical document, you'll see that the number of changes from white to black to white along a line corresponds to something like twice the number of characters. Compressed this way, one 80-character line in a document becomes a collection of approximately 160 transitions rather than 1728 pixels. Considering the number of lines there are on a page, that's a very compact representation of a real 200-dpi image (see "Group III Fax Compression").

By including a look-ahead compression feature, the CCITT definition takes these methods one step further. It offers short codes for "next scan line the same as this one" and "this section of scan same as above," thus permitting even more statistical compression.

Products for Documents

Despite the fact that fax-type compression won't work with gray-scale or color images, it is obviously a useful technique for compressing business documents that contain only text and line art. And to no one's surprise, a number of manufacturers have jumped on fax-type compression capabilities to streamline business-document handling. Products

range from simple board and software combinations for single-station use to complex systems designed to archive and index all the paperwork in a large, multisite business.

One example is the $995 Hurdler CER (compression, expansion, rotation) NuBus board available from Creative Solutions. It features the Group IV compression scheme—which improves error-handling slightly—in on-board ROM. (Minor errors may not matter when receiving faxes, but they become huge problems when writing to disk.) A fast coprocessor chip allows the CER to compress standard scanned files at a rate of 16 million monochrome pixels per second. Creative Solutions provides drivers for the CER so that users can direct files to the NuBus board; no other compression software is necessary.

A more advanced system, offered by First Financial Technology, is the document-archiving system called ArcImage. Originally developed as an in-house system for First Financial's own banking requirements, the $1895 ArcImage comes with both a NuBus compression accelerator and compression software. ArcImage also includes an easy-to-follow tutorial and a superior manual.

With ArcImage, the NuBus board intercepts the output of a high-speed scanner (the Fujitsu 3096 12-pages-per-minute automatic sheet feeder is First Financial's favorite) and compresses that output on the fly. The full-size PICT files never reach the hard drive. The system stores two different files—a low-resolution file for display and a high-resolution file for printing. This scheme makes for both fast on-screen retrieval and respectable LaserWriter output. Even though the full-blown ArcImage system consists of an optical drive jukebox, a high-speed scanner, and a network, just a hard drive and scanner can suffice. It's easy to picture a single-Mac small business going nearly paperless with ArcImage.

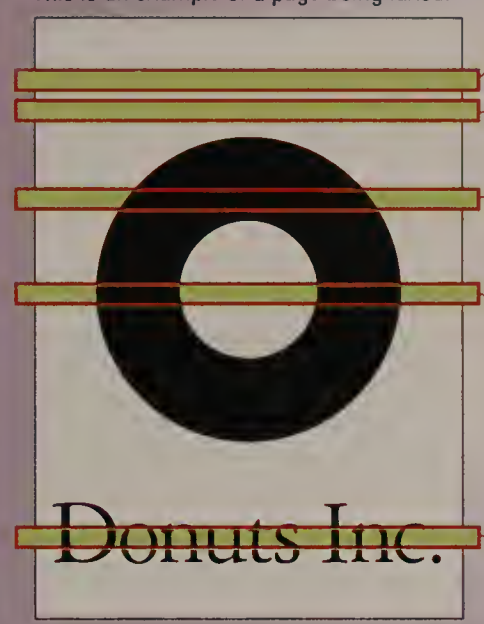
On the highest rung of the black-and-white-document-compression ladder are three very-large-scale systems, which can cost $100,000 or more depending on the configuration. These high-end systems include all the hardware—from scanners to storage—and software needed to compress paper documents and microfilm into a searchable format for quick retrieval on a Mac.

For example, the FastTrax system from Du Pont Electronics is specifically designed for compressing, storing, and retrieving engineering drawings. It uses networked Macs and what Du Pont calls an optical storage tower to construct and store a database of indexed drawings.

The MD Mars system from Micro Dynamics uses document and microfilm scanners to reduce archival documents to compressed files on a rewritable optical disc jukebox. Users can then retrieve those files over an AppleTalk network. MD Mars even offers backup for the archives in the form of WORM drives. Both FastTrax and MD Mars use the Hurdler CER board for compression.

CSX Technology's Visualink, meanwhile, allows Macs on a network to process a company's internal paperwork and fax traffic in compressed, indexed, and searchable archives. The key difference between Visualink and FastTrax or MD Mars is Visualink's ability to compress incoming faxes as they arrive, not just after they have been received.

Group III Fax Compression



When a Group III fax machine scans a blank line, it compresses line information by sending a short code that stands for "blank line." That code is transmitted to the receiving fax, which decodes it to recreate a blank line.

When two identical lines follow one another, the transmitting fax sends a short code that tells the receiving fax to repeat the previous line. This "same-as-previous" code works for both blank and nonblank lines.

The transmitting fax compresses this line by sending a code to indicate the length and color of each component. For example, the fax would send a code for one white line of length *X*, followed by one black line of length *Y*, ending with another white line of length *Z*.

This line requires that the transmitting fax send more codes to compress it: first a white line, then black, then white, then black, then white.

As lines become more complex—for example those that contain type—the amount of compression possible with Group III decreases. This line would require sending many lines—black and white—of varying lengths.

Unencoded = about 3.8MB (200 x 11 x 1728 pixels)
Encoded = 20–100K (depending on image)

Small but Colorful

If gray-scale or color images are your stock-in-trade, you will not be able to use the Group IV approach. True-color pictures contain huge amounts of information. Each pixel in a 300-dpi image is defined by 32 bits of information 8 bits for defining red, 8 bits for green, 8 bits for blue, plus 8 extra

COMPRESSION IN MOTION

It's no surprise that compressing and decompressing video is an issue totally distinct from compressing still pictures. In the world of video, the most important consideration is speed. Decompression rates must be fast enough to permit real-time (30-frames-per-second) playback of images, not one picture per 30 seconds.

Achieving real-time speed requires special-purpose hardware to handle the video images—it calls for a chip like the C-Cube CL550. Even with increases in Macintosh CPU speed, the software-based JPEG implementations are just too slow. The CL550 is a special chip that implements the JPEG algorithm in hardware, providing the 100-fold increase in speed required for video data rates.

At Macworld Expo in August 1990, SuperMac Technology demonstrated a board-and-software combination that compresses 24-bit color images and video as well as digital stereo audio onto storage devices. The board decompresses the video in real time for playback in a window on the Mac screen. SuperMac hopes to release the board, which runs with SuperMac's Spectrum/24 PDQ accelerated 24-bit display board, in the first half of 1991.

Because the amount of data in a video presentation is so great, video compression must operate at the highest levels the algorithms allow. Luckily, the chances are very slender of your spotting little bits of fuzz (resulting from information thrown away during compression) at 30 frames per second.

The Motion Picture Experts Group (MPEG), an International Standards Organization (ISO) group, is currently defining a standard compression-and-decompression algorithm for video. Because video and audio go hand in hand, MPEG is also defining an audio compression scheme. Its overall goal: reproduction of VCR/TV-quality video and CD-quality audio on computers equipped with either hard drives or CD ROM drives.

Like JPEG's algorithm, MPEG's algorithm is based on the compression technique called Discrete Cosine Transform (DCT). However, whereas 25:1 compression rates are adequate for still pictures, video and audio need compression rates of over 100:1. Although the JPEG standard can be used for video compression, each frame must be compressed as a separate still image. Special provisions for video proposed by MPEG include coding for similarity from one frame to the next in much the same way that JPEG exploits block-to-block similarities.

bits. (For more on what these 8 extra bits can do, see *State of the Mac* in this issue.) Even for gray scale, the information for each pixel takes up 8 bits. Because there's more information to deal with and the information changes continuously across a line scan, the compression schemes for text and line art are not readily applicable. Instead, color compression takes advantage of human beings' remarkably hazy perception of color in continuous-tone images.

When you see a color picture, you tend to see color areas and edges. Much of the small detail, shading variation, and absolute brightness data falls below your threshold of perception. Take absolute brightness, for example. A television screen *can't* get any blacker, photometrically speaking, than the gray you see when the television is off. When you're watching a show, the jet black you see is actually an illusion created by an adjacent, high-contrast light area.

By transforming a typical monitor's red-green-blue (RGB) picture into one based on *chrominance* (color scale) and *luminance* (brightness), color-compression algorithms make use of these quirks of human perception. The algorithms discard the information that you cannot perceive in an image, thus compressing the image.

In the past year, the compression scheme defined by the Joint Photographic Experts Group (JPEG) has gained almost universal acceptance as the standard method for working with still pictures. Another group, the Motion Picture Experts Group (MPEG), is currently finalizing a compression scheme for video (see "Compression in Motion").

Working with chrominance and luminance data—not RGB descriptions—also allows JPEG compression to exploit the slow rate of change of color and intensity across large parts of an image. The clear blue sky in a sunlit landscape, for example, contains lots of pixels but actually quite a small amount of information.

The JPEG scheme compresses an image by applying three different mathematical algorithms to individual 8-by-8-pixel squares: a discrete cosine transform (DCT), a quantization algorithm, and a text-compression-like encoding scheme (see "How JPEG Works"). Decompression reverses the procedure for each 8-by-8-pixel square. This probably sounds as if it requires a lot of computation. It does. A full-screen 32-bit color image takes between 20 and 40 seconds to compress.

Users can adjust the compression ratio of the JPEG scheme—trading image quality for greater compression. Interestingly, the time it takes to compress (and decompress) an image depends more on the contents of the image and less on the extent of compression. That's because what your eyes perceive as a complex image, compression software may not.

Products for Color Pictures

Two packages—Colorsqueeze from Kodak and PicturePress from Storm Technology—are available at this writing for end users. (As this article went to press, SuperMac Technology introduced its SuperSqueeze still-image compression software, which the company will include free with all SuperMac color graphics boards and storage systems.) The $179 Colorsqueeze is the easiest product to use for color image compression. Using the Kodak implementation of JPEG, you can specify one of three compression levels—high, medium, or

Colorsqueeze Results The image on the left is the original fish image. On the right is the same image after first being compressed at the highest level, and then decompressed with Kodak's Colorsqueeze. As you can see, it is very difficult to find any differences between the two images.

normal—for 24-bit PICT or TIFF (tagged-image file format) source files. These compression levels result in files approximately 1/24, 1/13, and 1/6 the size of the original file.

With Colorsqueeze, only at the highest level can you begin to detect differences between the original and a version that has been compressed and then decompressed (see "Colorsqueeze Results"). You can detect bits of speckling near sharp edges in an image at medium compression. At normal compression, it is nearly impossible to see any differences between a decompressed image and the original—even when inspecting greatly expanded magnified areas. If you work with graphics and need to store scores of color or gray-scale images, Colorsqueeze is a straightforward way to make your crowded hard drive spacious again.

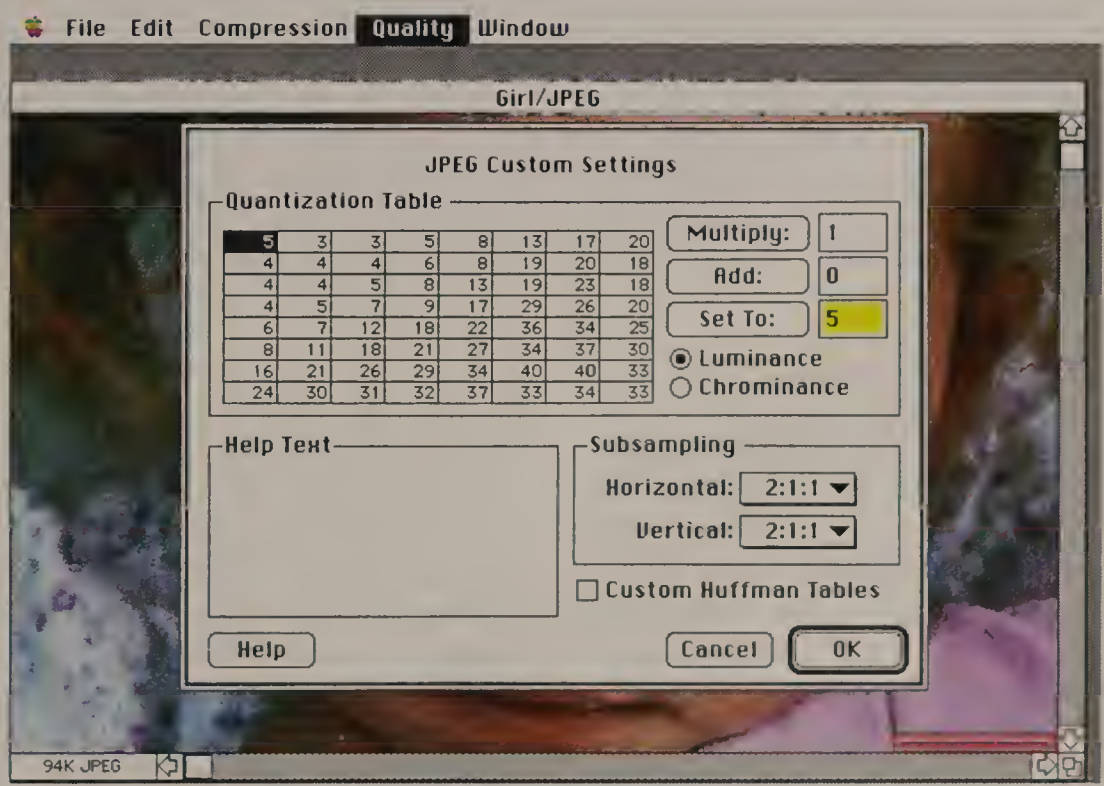
Although the $199 PicturePress was designed as an end-user software package, it is a veritable Disneyland of compression possibilities (see "PicturePress Playground"). Basically, PicturePress has everything Colorsqueeze has, and more—but it's intended for users who are a bit more sophisticated about image processing.

Besides allowing you to select four standard compression levels, PicturePress offers a Custom dialog box for tinkering with the weighting levels in the chrominance and luminance tables. (I find the Custom option better at producing interesting—though weird—photo effects on compressed pictures than at increasing compression over PicturePress's standard JPEG defaults.)

Storm also provides some interesting JPEG extensions in PicturePress (something that is possible when the chief scientist is one of the JPEG spec's authors). JPEG++ allows you to specify different levels of compression for different regions of an image. Another extension is *lossless mode,* which offers the maximum compression while retaining *all* the picture information—usually a compression factor of between 2 and 3. The scheme is called lossless because no information is discarded during compression; in contrast, the usual JPEG methods are referred to as *lossy* because they deliberately discard information you are unlikely to notice.

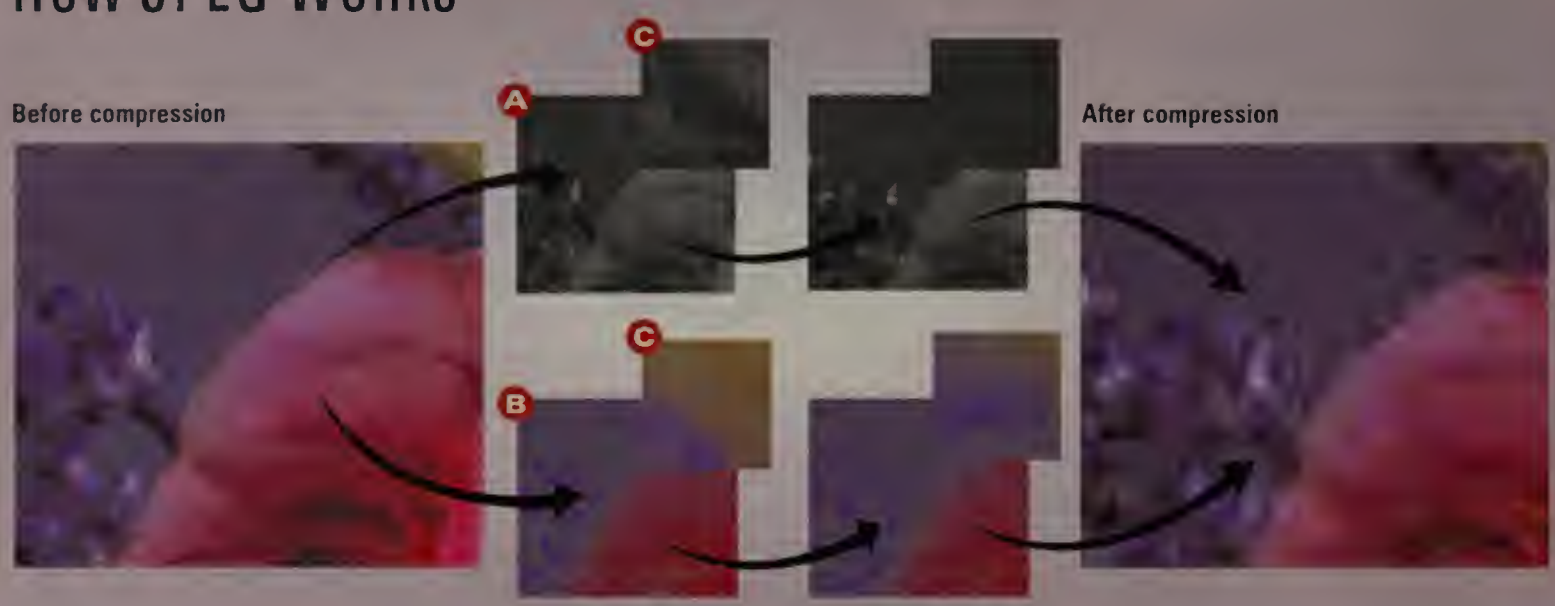
Storm Technology has also announced the $999 PicturePress Accelerator, a compression accelerator board for PicturePress. The NuBus board (which comes with PicturePress software) features two general-purpose digital signal processors (DSPs) that handle the gobs of arithmetic required for compression encoding. PicturePress can automatically route compression computations to the board, yielding an apparent speed improvement of 20 times or so. The end result: computation not quite fast enough for video decompression (at least not with this version of the board). But opening compressed images is as fast as—or faster than—recalling a large raw file from a hard drive.

Meanwhile, C-Cube introduced the $995 Compression Master, a NuBus board that incorporates the company's CL550 image-compression chip. The board includes Salient's DiskDoubler Plus, which is used to compress both PICT and TIFF files. Another company, Advent Computer



Picture Press Playground PicturePress from Storm Technologies offers detailed control over all aspects of image compression, right down to adjustment of the visual-response weighting tables. PicturePress also offers lossless compression and optional extensions to the JPEG standard.

How JPEG Works



The JPEG compression process takes several steps. First, a preprocessing step turns a color (RGB) picture into chrominance and luminance information. This transformation allows for higher compression ratios.

The YUV representation comes closer to how the human visual system perceives image information than an RGB representation does. The Y component (A), or the luminance, corresponds closely to light intensity; U and V contain chrominance (color) information (B).

Next the image is divided into 8-by-8-pixel blocks (C). The YUV information for each 8-by-8-pixel block is processed with a mathematical transform called a *discrete cosine transform,* or DCT. The DCT performs an analysis of the 8-by-8-pixel image, identifies the actual color frequencies that occur in it, and removes redundancy within the pixels.

The JPEG compression scheme then discards some of this frequency information in a step called *quantization*. Quantization causes many of the higher frequencies to become zeroes. This has little effect on how you perceive the image because the human visual system is less sensitive to higher frequencies than it is to lower frequencies.

The amount of information thrown away depends on the degree of compression desired. At the highest compression level, local detail gets utterly obliterated, yielding a uniformly gray 8-by-8 block. At the lowest level of compression, pixel-by-pixel structure is almost entirely preserved.

The average gray-scale (luminance) and color information is further encoded by tracking only the differences from one block to the next, writing out the resulting blocks as lines of numbers, and then compressing those lines of numbers. Because the processing produces many zero values in the 8-by-8 blocks, the final coding (performed with both a Huffman encoding scheme and a scheme similar to Group III fax) can perform feats of efficiency. The original 24 bits per pixel or 1536 bits (192 bytes) per block shrink down to a handful of bits that encode the visual characteristics of the whole block.

Products, has also announced a board based on the CL550. Called the Neotech Image Compressor, it is expected to list under $1300.

Tools for Developers

The range of data-compression products doesn't stop with end-user boards and software. There are also a host of developer tools on the market, for programmers interested in expanding the uses of compression.

In the general-purpose arena, both Aladdin Systems and Salient Software offer developer kits. The kits allow programmers to incorporate StuffIt Deluxe and DiskDoubler compression schemes, respectively, into applications via interapplication communication (IAC) capabilities.

Programmers who are interested in color and gray-scale compression also have options. The pioneering firm Electronics for Imaging (EFI) offers a JPEG-compliant software library called Ecomp. Ecomp can be used either for programming new imaging applications or for modifying existing applications to include image compression.

C-Cube has introduced the Image Compression Interface (ICI), a standard way for third-party applications to interface with compression hardware and software. The company's $195 Compression Workshop includes all the source code in standard dialects of C and Pascal (MPW, Think) needed to integrate ICI into any application. ICI support is currently available from Adobe Photoshop, QuarkXPress 3.0, StuffIt Deluxe,

Electronic Arts' Studio-32, and DiskDoubler Plus. C-Cube also offers a $3000 hardware-and-software prototyping tool kit that allows developers to evaluate the C-Cube LC550 chip, the company's hardware implementation of the JPEG algorithm.

Let's Get Small

In the old days, the biggest MacPaint file you could create for a single page was under half a megabyte, even if you specified every single pixel in FatBits. Along came 32-bit Color QuickDraw, exploding bitmap file sizes by factors of 100. At the same time, the sheer number of monochrome files a business Mac was expected to handle exploded as well, and scanners only made storage problems worse.

What about the future? Within a year no self-respecting manufacturer of a true-color paint program will dare to ship its product without some form of built-in software compression and decompression (activated perhaps by a command in the File menu). Other glimpses of a future that is already happening include new color scanners and video frame grabbers that provide built-in compression in hardware.

Apple, meanwhile, is also actively pursuing its own compression schemes. In a technology demonstration at the Siggraph Conference in August 1990, Apple's Advanced Technology Group showed proprietary video-compression and -decompression software that could become an extension to system software and 32-bit QuickDraw.

With speed limitations in mind, some vendors have turned to specialized chips like the C-Cube CL550 to implement compression algorithms in hardware. In October, Next announced the Nextdimension, a 32-bit color video-display-and-capture board. It features a 64-bit RISC-based dedicated graphics coprocessor and C-Cube's CL550 image-compression processor (see "Next on the Agenda," elsewhere in this issue).

Apple may even find space for compression chips on the main logic board of the Mac itself. Certainly the 10MHz CL550 is a bargain—its price is close to that of a 1MB Single Inline Memory Module (SIMM)—even at the chip's currently low production volumes. Building compression hardware into the Mac would allow Apple to consolidate its position in the world of color graphics and ward off competition from PCs and UNIX workstations.

But hardware may not be the only solution to speed. Radius is demonstrating a software compression program, code-named Piculator, that could ultimately go head-to-head with hardware still-picture JPEG compression and become an acceptable substitute in graphics-intensive applications. The program can shrink a 1MB color PICT file to compressed form (with a compression factor of 20 or more) in less than 6 seconds on a Macintosh IIcx. At that compression rate, the overhead needed to decompress a file is negligible compared to the overhead necessary to launch an application. Radius estimates an early 1991 release and a price of $300 for the program.

No doubt, data compression is coming soon to a Mac near you—if it hasn't already arrived. And although file-compression techniques used to be the domain of medical-imaging specialists and NASA scientists, a year from now most of us will wonder how we ever lived without them. ◻

See *Where to Buy* for contact information.

SQUEEZE PLAY

Product	Vendor	Price	Notes
FILE COMPRESSION			
Compactor	Bill Goodman	$25	shareware
StuffIt Classic 1.6	Aladdin Systems	$25	shareware
StuffIt Deluxe	Aladdin Systems	$99.95	
DiskDoubler	Salient Software	$79	
BLACK-AND-WHITE COMPRESSION			
Hurdler CER	Creative Solutions	$995	
ArcImage	First Financial Technology	$1895	
FastTrax	Du Pont Electronics	contact vendor	
MD Mars	Micro Dynamics	$700,000+	
Visualink	CSX Technology		
COLOR AND GRAY-SCALE COMPRESSION			
Colorsqueeze	Kodak	$179	
Neotech Image Compressor	Advent Computer Products	$1299	
PicturePress	Storm Technology	$199	
SuperSqueeze	SuperMac Technology	$49, free bundled with graphics boards and drives	
Compression Master	C-Cube	$995	
PicturePress Accelerator	Storm Technology	$999	
DEVELOPMENT TOOLS			
Ecomp	Electronics for Imaging	$1000	for internal use
		$10,000	for use in products
Compression Workshop	C-Cube Microsystems	$195	for internal use
		$15,000	for use in products
StuffIt Engine Developer Kit	Aladdin Systems	contact vendor	
DiskDoubler Developer's Kit	Salient Software	$200	

Charles Seiter *is the developer of several methods for gray-scale compression of medical images, and the* Macworld *contributing editor in charge of matrix diagonalization*

FAST COLOR

Color QuickDraw lives up to its name with help from seven graphics accelerators

BY CHERYL ENGLAND SPENCER

Little by little, it's been sneaking up on us—but it wasn't until 32-bit QuickDraw came along that it really grabbed us with its teeth and shook us around. This monster, this creeping system slowdown, has made us all covet our neighbor's Macintosh IIfx. Yet when loaded down with a 24-bit display, even the speedy Mac IIfx doesn't satisfy most users' expectations of instant screen refresh.

Like Saint George, the hero who slew the dragon, QuickDraw accelerator boards are here to end users' fights with slow scrolling, screen updates, and photo-realistic image redraws. These boards offload graphics functions from the Mac's central processing unit. Essentially, accelerator boards are coprocessors, much like a floating-point chip, except that they speed up graphics display, not math calculations.

Macworld Lab tested seven QuickDraw accelerators for the Mac II family: Apple's Macintosh Display Card 8•24 GC; the RasterOps Accelerator; SuperMac Technology's Spectrum/24 PDQ, Spectrum/24 Series III, and Graphics Accelerator; and Radius's QuickColor Graphics Engine and DirectColor/GX. RasterOps' 24S accelerator arrived too late for testing.

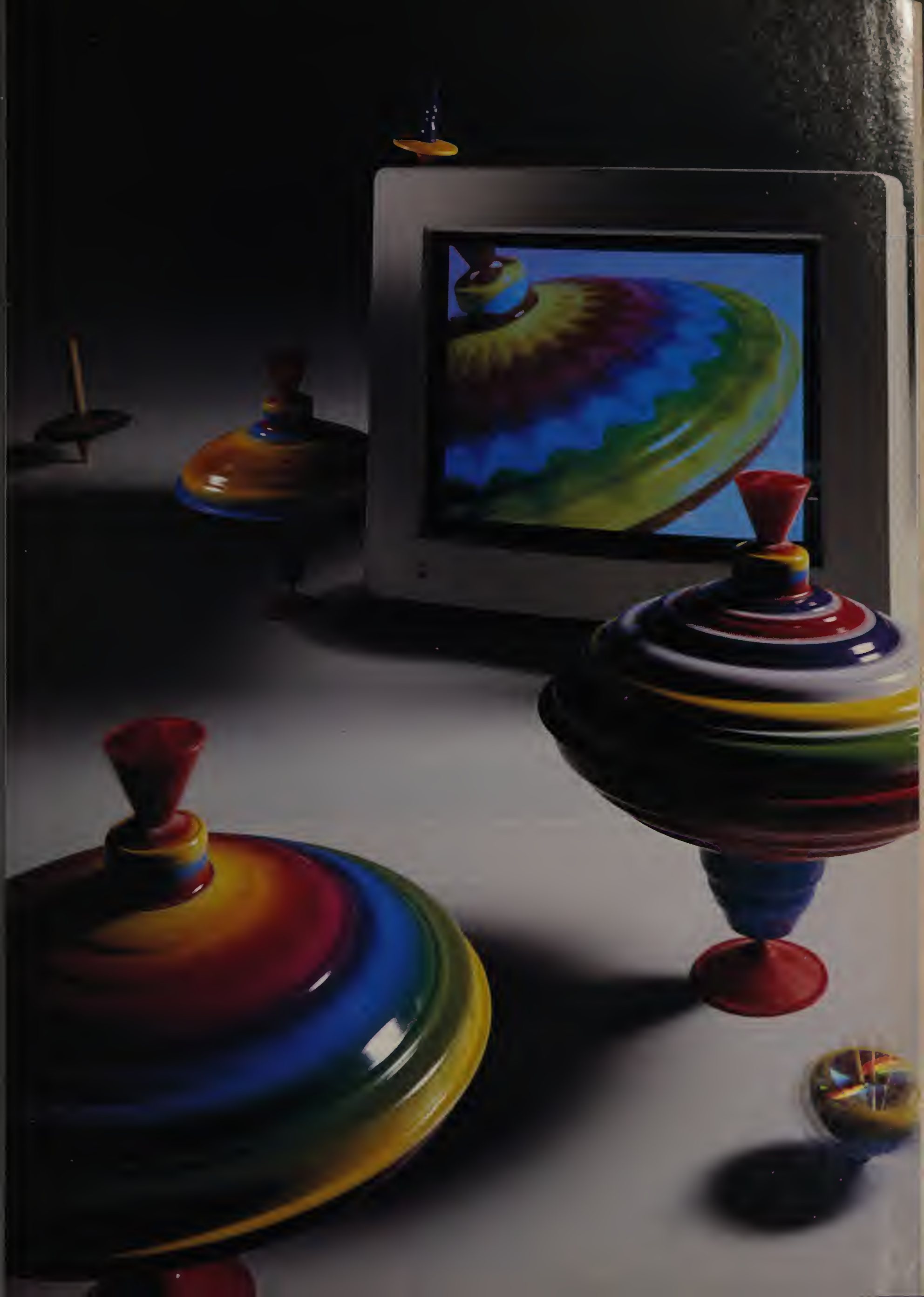
All QuickDraw accelerators speed up major graphics functions, such as scrolling and moving a window, when a Mac runs in 24-bit mode. In fact, the boards' performance on these tasks—even when driving a 19-inch monitor—rivals the speed of an 8-bit system. And the star of the show, the 8•24 GC, makes most QuickDraw functions run faster in 24-bit mode than they do in 8-bit mode with Apple's unaccelerated, 24-bit 8•24 board.

32-Bit Holdup

Speeding up screen updates isn't as simple as adding a faster processor. That's because 32-bit QuickDraw itself presents a bottleneck. Another bottleneck is the NuBus, the interface used by the Mac's processor to transfer video data from memory to the video display board.

QuickDraw routines—pieces of code in the Mac's ROM—handle all the Mac's graphics functions. There's a routine to draw a circle, one to fill a rectangle, one to draw text, and one to move bits around the screen. All Macs since the IIci come with 32-bit QuickDraw built into ROM.

DAVID BISHOP



(Users with Macs designed before 32-bit color QuickDraw was developed in 1989 must install an INIT in the System Folder to patch 32-bit QuickDraw into memory.) When an application needs to draw or move something on screen, it calls the QuickDraw routines in ROM, and the Mac's processor executes them. Meanwhile, the Mac can't process any other instructions, such as mouse clicks or keystrokes, so overall Mac performance slows.

It also takes QuickDraw a lot of time to get an image ready to display on screen. Before QuickDraw can draw an object, the Mac's processor has to calculate all of the setup information. For example, to draw a line, QuickDraw must determine the line's width, color, pattern, and mode (for example, inverted). Obtaining some types of setup information, such as that involving color palettes, requires a fair amount of manipulation by the processor and can be time-consuming. Once again QuickDraw hogs the Mac's processor.

Board developers accelerate QuickDraw two different ways: either by directing drawing commands away from the Mac's processor to a faster processor on the accelerator board for execution, or by implementing specific QuickDraw routines in hardware on the accelerator board. All QuickDraw accelerator boards include a software patch—usually an INIT—for rerouting drawing commands. Application developers don't need to give their applications any special instructions to take advantage of the accelerator.

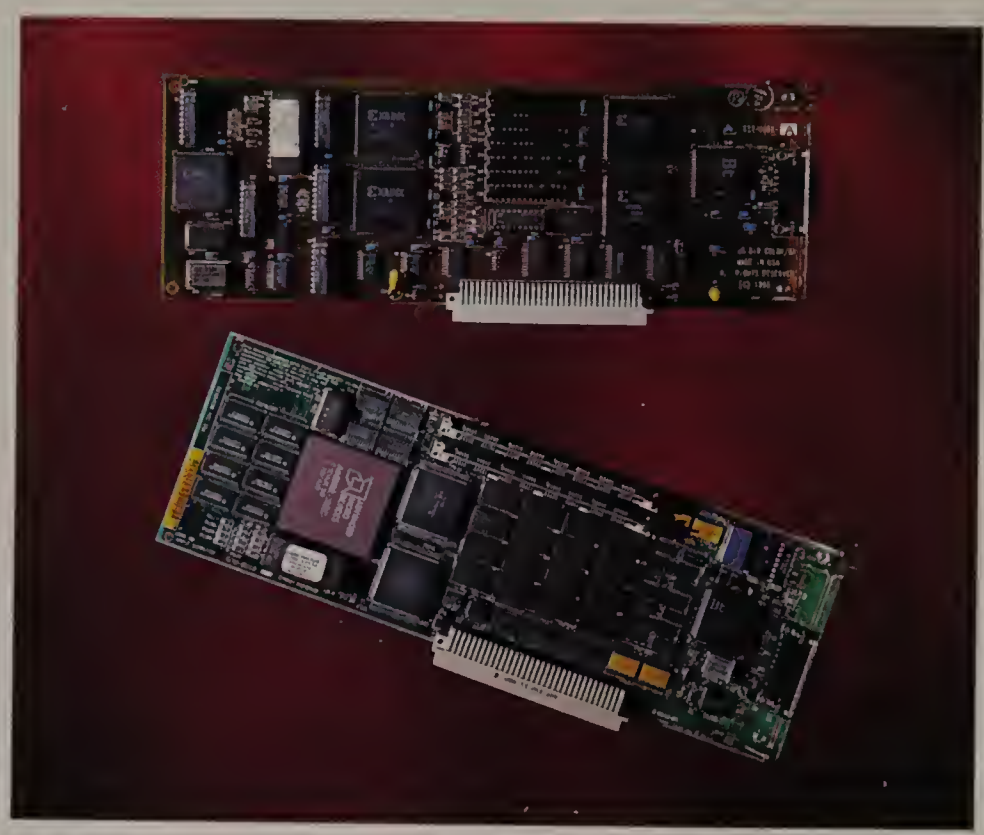
Because Apple does not publish the QuickDraw source code, third-party board developers must work from scratch to decipher the code and create the patches. Thus, third-party boards do not accelerate the entire set of QuickDraw routines; rather, vendors concentrate on the most frequently used routines—ScrollRect (scrolling), CopyBits (window movement), Text:scrCopy (displaying text), and Paint. In addition, third-party board performance varies on individual routines. Apple's board, on the other hand, accelerates nearly every piece of QuickDraw code, giving it an overall speed advantage.

The NuBus Interface

The NuBus bottleneck occurs because a vast amount of data is necessary to display 24-bit images and the NuBus is limited in how much information it can deal with at one time. The NuBus is constantly arbitrating requests from various system components. A processor-direct slot, such as the one in the SE/30, transfers data faster than the NuBus because the slot hooks directly into the processor—it doesn't need to arbitrate system requests.

Most QuickDraw accelerators avoid the NuBus bottleneck by putting both accelerator and video logic on one board. Video RAM (VRAM) chips act as frame buffers to store images on the boards. Thanks to frame buffers, the Mac doesn't have to transfer image data between the accelerator and the video board over the NuBus.

Three boards, the 8•24 GC, the RasterOps Accelerator, and the RasterOps 24S, also avoid some of the NuBus bottleneck by supporting Apple's GWorld off-screen graphics environment. GWorld allows applications to draw images off screen. These off-screen images are stored in RAM on the accelerator board rather than in memory on the main logic board. When an application running on a Mac equipped with an 8•24 GC board calls GWorld, the 8•24 GC's software allocates space in an off-screen buffer on the 8•24 GC. The application can use that buffer as a scratch pad for drawing images, which can be sent to the screen in one burst. Few applications currently use GWorld. Since Apple is encouraging developers to utilize GWorld and its ability to provide seamless screen updates, more applications will no doubt use it in the future.



MARK JOHANN

Radius DirectColor/GX (top) and Apple Macintosh Display Card 8•24 CG

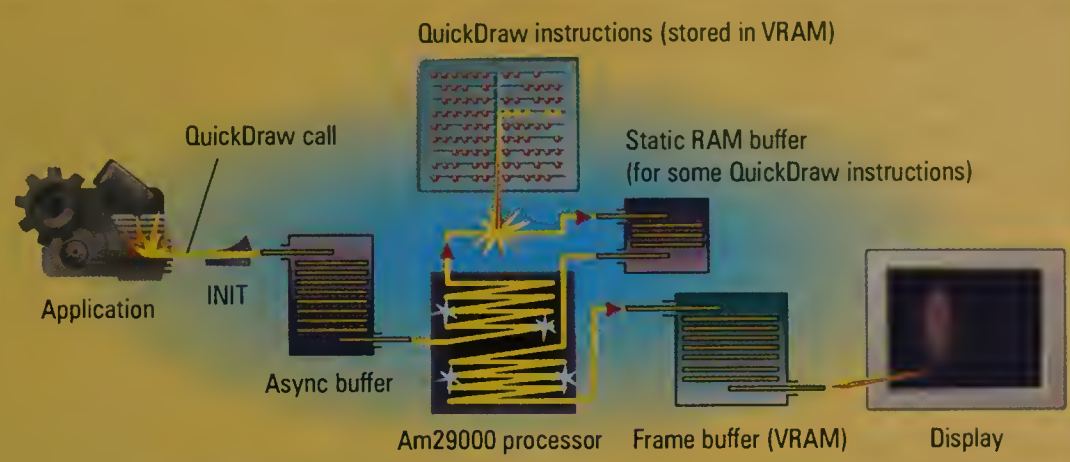
Apple's Entry

The 8•24 GC uses a 33MHz RISC processor, the Advanced Micro Devices Am29000, to execute QuickDraw routines, thus freeing the Mac's processor for other tasks. To make QuickDraw run on the Am29000, engineers at Apple had to completely rewrite QuickDraw in C—a daunting task thanks to QuickDraw's complexity (about 110,000 lines of assembly code). Apple also faced the challenge of dissipating the amount of heat that the Am29000 puts out. But despite these problems, by using a general-purpose processor Apple has ensured that if it changes the QuickDraw code, 8•24 GC users will be able to upgrade simply by installing new software.

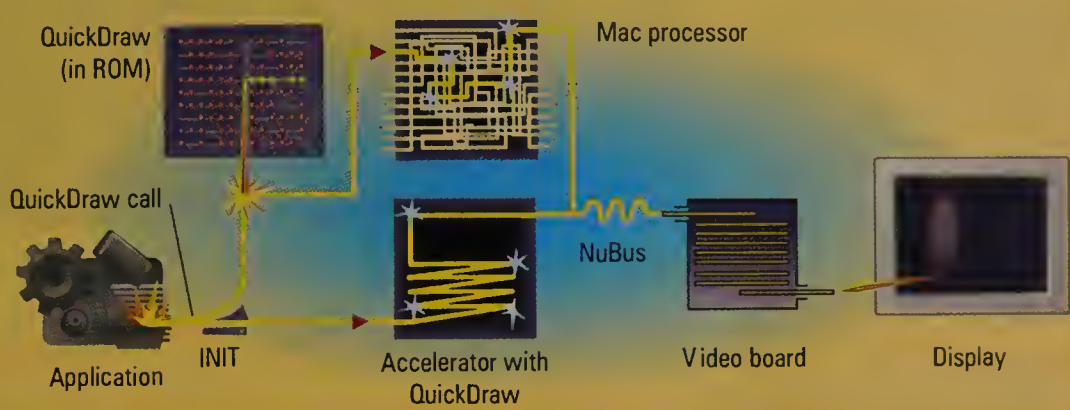
The 8•24 GC uses other tricks besides a fast processor to speed up QuickDraw; it also has a buffer that remembers the setup information for each window. As long as QuickDraw draws to the same window on screen, the 8•24 GC can incrementally update the setup information, which can garner huge time savings. With the other boards, if the setup time is

Comparing Accelerators

When an application running on a Mac with a Macintosh Display Card 8•24 GC calls QuickDraw, InterProcess Communication (IPC) software—part of the INIT—redirects the call to the board. The INIT queues the calls in an asynchronous buffer, and sends a "continue" signal back to the application. The Am29000 executes the calls one by one in the order received. It does so by looking first for the appropriate QuickDraw instruction in the 8•24 GC's 64K of fast static RAM. (The Am29000 memory management unit maps as many instructions to static RAM as possible for faster access.) If the instruction isn't in static RAM, the Am29000 retrieves it from video RAM (VRAM) on the board. The board keeps all QuickDraw instructions, as well as the 24-bit image, in VRAM.



In contrast, the RasterOps Accelerator executes selected QuickDraw calls whose instructions are built into the board. The INIT checks to see if the call can be handled by the accelerator; if so, the call is rerouted. If not, the call is executed on the Mac's processor. The RasterOps Accelerator must then send data to a video board over the NuBus.



longer than the actual drawing time, then the board can't improve performance. For instance, if QuickDraw must draw 10,000 short lines, it takes the Mac as long to set up the operation as it takes QuickDraw to draw the lines. Since the 8•24 GC can eliminate setup time for repetitive tasks, it is better suited to jobs such as complex CAD drawings.

Since setup calculations are executed on a Mac's processor, a fast Mac such as a IIfx speeds up some QuickDraw operations. In our tests, a Mac IIfx running in unaccelerated 24-bit mode equaled a Mac IIcx with the 8•24 GC running in 24-bit mode when drawing short and midlength lines. The other QuickDraw accelerator boards were at least twice as slow since they don't address setup time. The Mac IIfx lost its advantage when drawing longer lines, because the QuickDraw operation began to take more time than the setup.

Once the Am29000 converts a draw command to pixels, it sends the pixels to one of two places—a frame buffer on the 8•24 GC or a frame buffer on another video board. If the pixels go to the frame buffer on the 8•24 GC, they are immediately drawn on the Mac's screen. The only reason the 8•24 GC might send the pixels to another board is if the 8•24 GC is acting as a *bus master*—that is, the 8•24 GC is accelerating all the video boards in the system. The 8•24 GC locks the NuBus so that no other boards or system components (even the Mac's processor) can use it. The 8•24 GC then moves the pixels via block transfer to another display board. (Block transfer is a special mode that transfers blocks of data at the NuBus's full speed capacity.) Even so, the NuBus creates a bottleneck that cripples the 8•24 GC somewhat as a bus master. Also, the 8•24 GC can only accelerate display boards that support block-transfer mode.

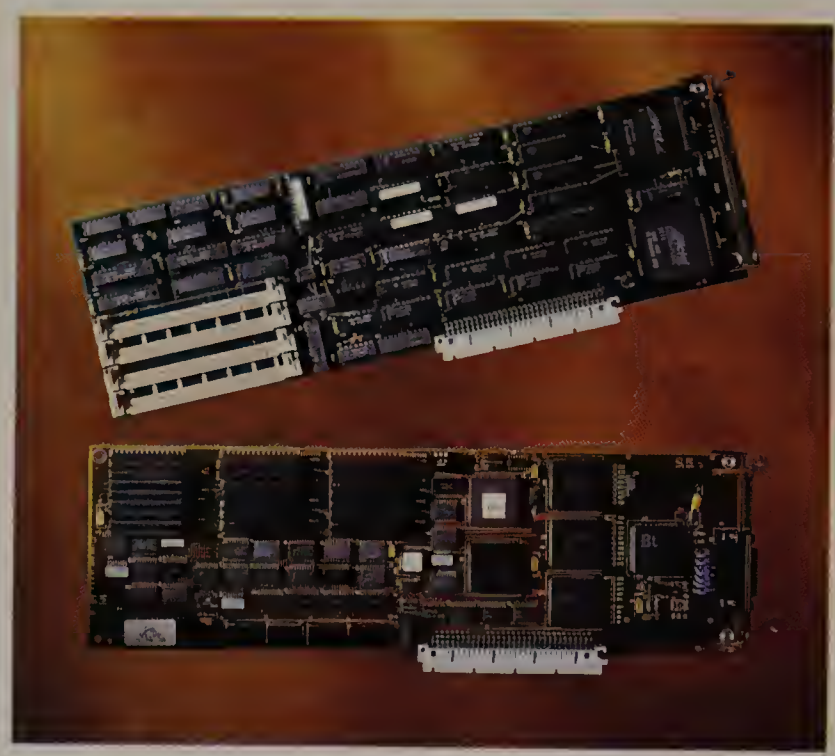
Since the Mac's processor runs in parallel with the 8•24 GC's processor, Apple has had to solve the classic left-hand-doesn't-know-what-the-right-hand-is-doing problem. The Mac doesn't know when the 8•24 GC will start or finish a request; the 8•24 GC doesn't know when it will receive a command or get the next one. This parallelism results in very fast video display, but it's also prone to synchronization problems between the 8•24 GC and the Mac's processor—a problem Apple seems to have solved.

RasterOps Scheme

Despite the difficulty of reversé-engineering QuickDraw, third-party developers have created some amazingly effective boards—proving once again that you don't have to buy an Apple product to get fine results. Take, for instance, the RasterOps Accelerator, a NuBus board that has custom silicon chips with QuickDraw routines built into them. (The only drawback to using custom silicon is that if Apple changes QuickDraw's routines, users will need a new cdev or maybe even a new ROM.) Unlike the 8•24 GC, the

Accelerator contains only the accelerator logic; a video display board such as the RasterOps 24L or Apple's Macintosh Display Card 8•24 must be purchased separately. The RasterOps solution uses two slots in a Mac, but provides a bit more flexibility than a single board since the accelerator board can be replaced or upgraded separately from the video display board, or even added later.

Also unlike the 8•24 GC, the RasterOps Accelerator must go across the NuBus to transfer information between the video memory on a display board such as the 24L and the Accelerator's own frame buffer. But since both the 24L and the Accelerator support block-transfer mode and RasterOps has minimized system slowdowns, the RasterOps Accelerator runs major graphics functions quickly. In fact, the RasterOps Accelerator was the only board to hold its own against the 8•24 GC in invert operations. In addition, when used as a bus master the RasterOps Accelerator can somewhat speed up display boards that don't support block transfer, making the Accelerator board an excellent choice for running multiple boards in an accelerated mode.



MARK JOHANN

RasterOps Accelerator (top) and RasterOps 24L

The RasterOps Accelerator includes four SIMM slots so that users can add either 4MB or 16MB of memory. Applications that support GWorld can use this memory to store an entire image on the Accelerator. QuickDraw runs faster because the Accelerator can then operate on the image immediately in its local buffer, rather than waiting for the Mac's processor to write the image into the frame buffer. Alternatively, you can partition the memory so that some of it works as a RAM disk. I found this particularly handy for loading images from applications such as

LOW-LEVEL TESTS

All times are in seconds

Paint Objects

Average time to paint 50 single-color rectangles, 50 ovals, 50 round rectangles, 50 arcs, and 50 polygons on 24-bit display.

Color Fill Region

Average time to fill a region 50 times with an 8 x 8 pattern (green bar) and a 32 x 32 pattern (blue bar) on a 24-bit image.

Draw Lines

Average time to draw 2500 vertical, horizonal, and diagonal 5-pixel lines (green bar); 4000 vertical and horizontal 400-pixel lines, 5800 diagonal 400-pixel lines, and 800 diagonal 400-pixel lines (blue bar).

*unaccelerated

Macworld Lab tested all the QuickDraw accelerators in a Mac IIcx with 8MB RAM. The accelerators were tested with the 13-inch AppleColor High-Resolution RGB monitor, except for the QuickColor Graphics Engine, which was tested with the 19-inch Radius Color Display. The Spectrum/24 PDQ was also tested with a SuperMac 19" Color Display. The low-level tests were performed by Hydra, a QuickDraw benchmark program written by the Donoho Design Group for the Austin

Adobe Photoshop, Adobe Illustrator, and Swivel 3D, which don't use QuickDraw.

On the downside, the RasterOps Accelerator was a bit slower than the other boards on many operations. For instance, although the Accelerator matched the other boards in CopyBits operations; it was slow in operations involving Overlapping CopyBits.

RasterOps' other accelerator, the 24S, arrived too late for Macworld Lab to time it. Subjectively, however, I liked this 8•24 GC competitor. The 24S appears not to run all QuickDraw operations as quickly as the 8•24 GC does, but it has snappy response on the major graphics functions.

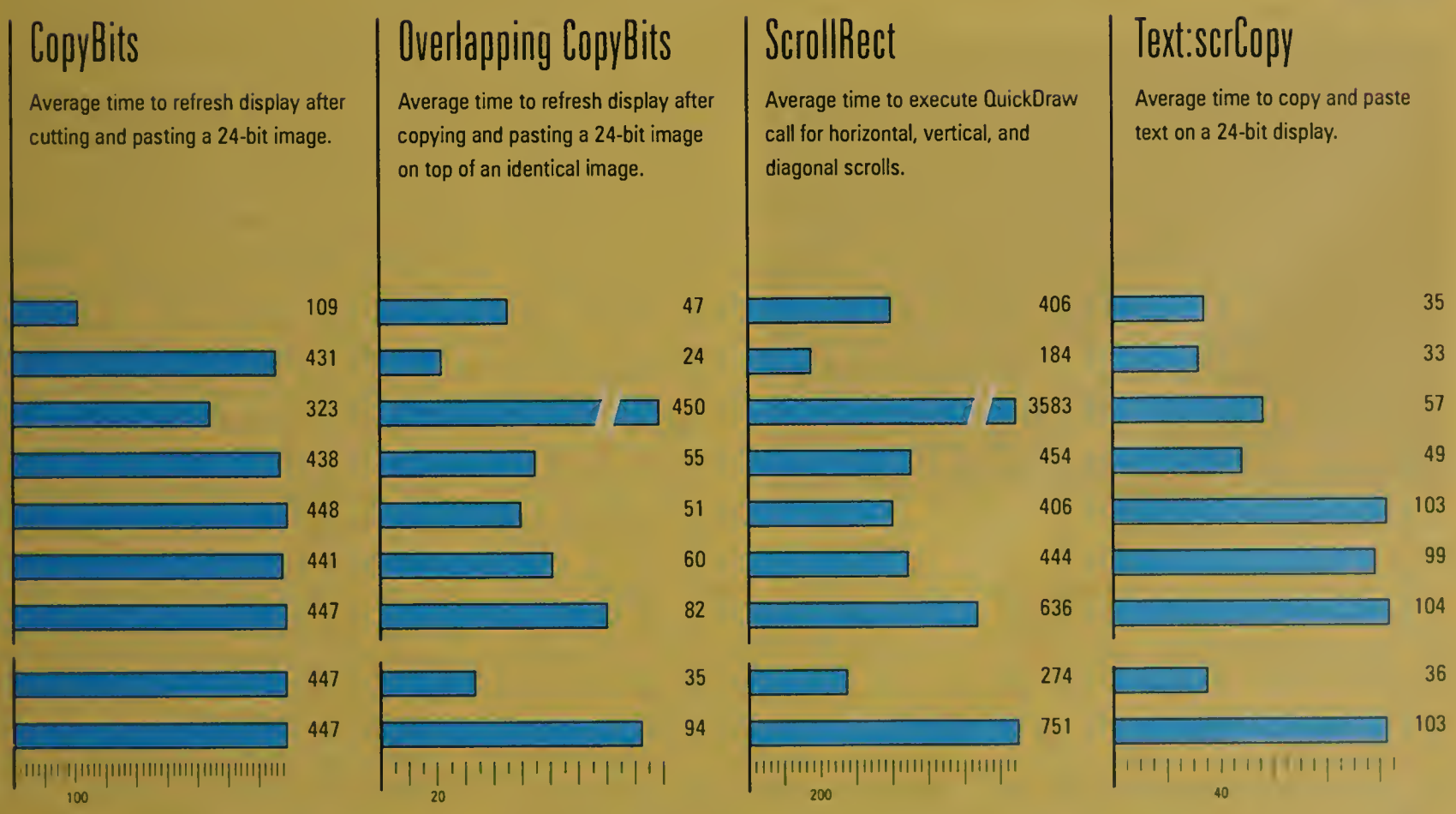
SuperMac's Speedsters

Three accelerators from SuperMac—the Graphics Accelerator, the Spectrum/24 Series III, and the Spectrum/24 PDQ—also use custom silicon chips to process QuickDraw commands. The $399 Graphics Accelerator works with one of SuperMac's older video boards, the ColorCard/24. The Graphics Accelerator does not include any 24-bit video circuitry and it works only with the AppleColor monitor and compatibles. Because it attaches directly to the ColorCard/24, the Graphics Accelerator doesn't need to support NuBus block transfer. And the Graphics Accelerator and ColorCard/24 combination requires just one slot in a Mac II. Based on our speed tests, however, the Graphics Accelerator can't compete with the 8•24 GC or with SuperMac's own Spectrum/24 PDQ.

SuperMac's Spectrum/24 Series III and Spectrum/24 PDQ boards contain video and acceleration on the same board, like the 8•24 GC. The Spectrum/24 PDQ is the only board that supports 15-inch, 16-inch, and 21-inch monitors as well as the AppleColor and 19-inch monitors. The Spectrum/24 Series III doesn't work with as many monitors and it's not as fast as the PDQ, but it's $1000 cheaper. Neither board is a bus master, so they can't accelerate multiple monitors as the RasterOps Accelerator can.

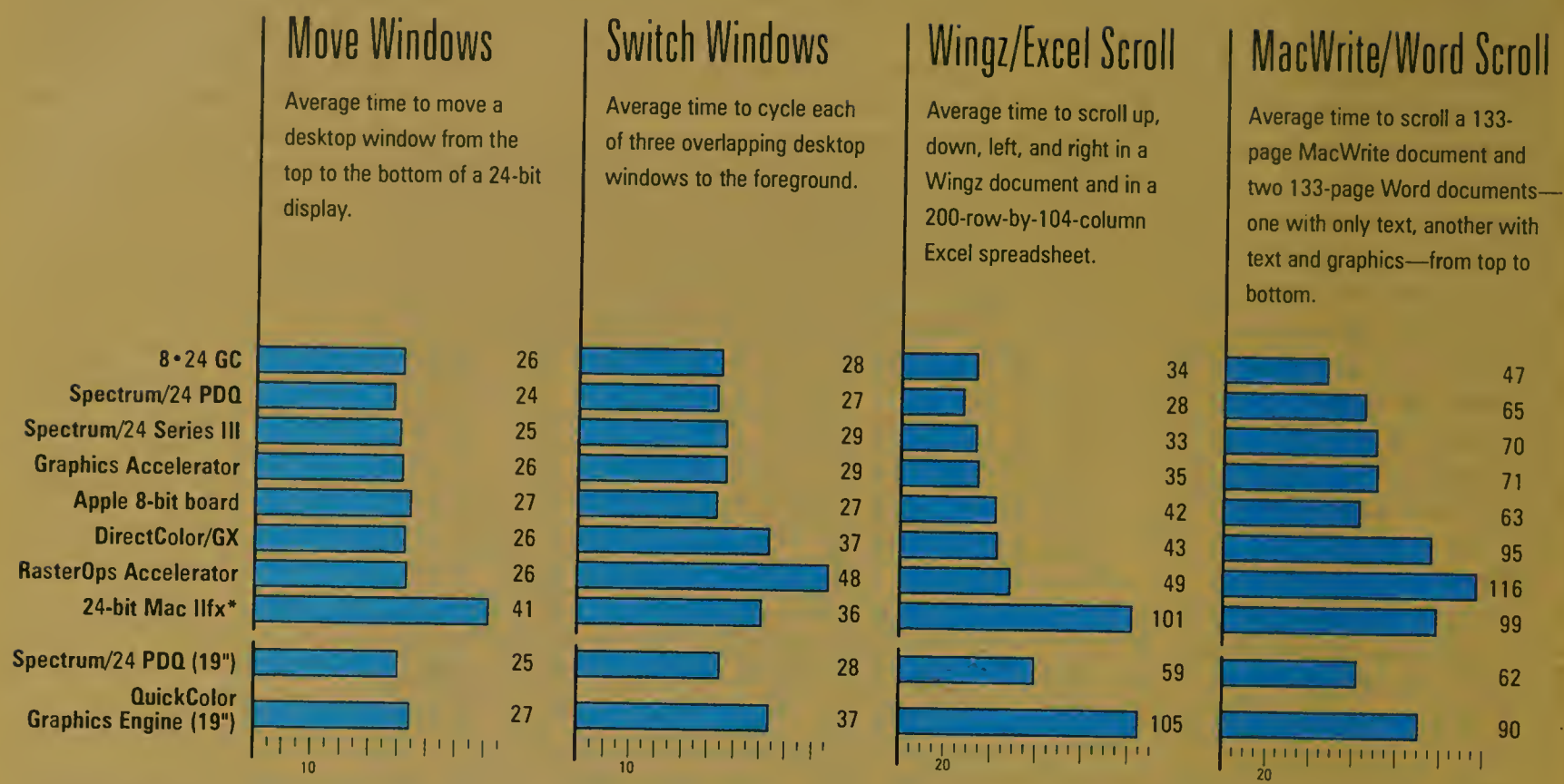
All the SuperMac boards beat the 8•24 GC in tests that required manipulation of a region. In three of the region tests—painting a region, filling a region with an 8-bit-by-8-bit color pattern, and filling a region with a monochrome pattern—the Spectrum/24 PDQ was over twice as fast as the 8•24 GC, even with a 19-inch display. In three other tests—filling a small region with a 32-bit-by-32-bit color pattern, inverting a region, and framing a region—the Spectrum/24 PDQ just squeaked past the 8•24 GC.

In our low-level ScrollRect test, the PDQ beat out the 8•24 GC. Although this seems to indicate that the PDQ would be faster at scrolling than the 8•24 GC, that is not always the case. The PDQ beat the 8•24 GC by a slim margin when scrolling spreadsheets and an image displayed at 200 percent in ColorStudio. Yet when scrolling word processing documents, the 8•24 GC flew past the PDQ. That's



Macintosh Developer's Association. You can see when 32-bit QuickDraw, not Mac CPU speed, becomes a bottleneck by comparing the performance of the unaccelerated Mac IIfx with that of the accelerated Mac IIcx systems. In addition, you can see the effect NuBus transfers play in 24-bit display performance. The RasterOps Accelerator and Radius QuickColor Graphics Engine, the accelerators that do not offer on-board video, performed much slower in the Overlapping CopyBits, ScrollRect, and Text: srcCopy tests.

APPLICATION-LEVEL TEST All times are in seconds



*unaccelerated

The real-world tests conducted by Macworld Lab show that in many cases, a QuickDraw accelerator makes a 24-bit Mac IIcx system perform close to—or better than—a Mac IIcx system equipped with an Apple High-Resolution Video Board (8-bits). In fact, an accelerated IIcx did better than an unaccelerated IIfx when moving windows and (with one exception) when scrolling through large multifont, color documents. Except where indicated, the monitor used was the 13-inch AppleColor High-Resolution RGB monitor.

MARK JOHANN

SuperMac Technology Spectrum/24 PDQ

because the 8•24 GC card caches font information in off-screen memory, therefore bypassing the Mac's font manager.

The Radius Duo

Radius's two products, the QuickColor and the DirectColor/GX, are configured differently. The older board, the QuickColor Graphics Engine, was designed two years ago as an option for users of Radius's 24-bit 19-inch Color Display. Since Radius already had an installed base of users, it designed the QuickColor the way RasterOps designed its Accelerator—the accelerator circuitry is contained on an add-in NuBus board that does not include video circuitry. But instead of using custom silicon chips as the RasterOps Accelerator and SuperMac boards do, the QuickColor contains a RISC processor—a 6 MIPS programmable Acorn VL86C010. The Acorn chip is slower than the 8•24 GC's Am29000 because the VL86C010 has fewer, less densely packed transistors. Still, this general-purpose processor turns out admirable performances, and its lower transistor density means that it runs much cooler than the Am29000.

At first glance, the QuickColor's performance seems to equal that of the RasterOps accelerator. In reality, the QuickColor is doing more work in the same time. That's because the QuickColor runs a Radius Two Page Display at 1152 by 840 resolution while the RasterOps system has a lower, 1024 by 748, resolution. Not only must the QuickColor handle more pixels, but at any resolution over 1024 pixels the display board must use two fetches to get data onto the screen from VRAM. Video memory chips can hold only 1024 kilobits of data—enough to fill a 1024-by-748-pixel screen, but not enough for an 1152-by-840-pixel screen.

Radius's newer accelerator, the DirectColor/GX, uses custom silicon and, like the 8•24 GC, contains video circuitry on the accelerator board. The

QUICKDRAW ACCELERATORS COMPARED

Board	Macintosh Display Card 8•24 GC	Direct-Color/GX	QuickColor Graphics Engine	RasterOps Accelerator	RasterOps 24S	Spectrum/24 PDQ	Spectrum/24 Series III	Graphics Accelerator
Company	Apple Computer	Radius	Radius	RasterOps Corporation	RasterOps Corporation	SuperMac Technology	SuperMac Technology	SuperMac Technology
Price	$1999	$1095	$595	$495	$1195	$4999	$3399	$399
Includes video circuitry	●	●	○	○	●	●	●	○
Includes RISC chip	●	○	●	○	○	○	○	○
Includes custom silicon chips	○	●	○	●	●	●	●	●
Supports block transfer	●	●	●	●	●	○	○	○
Acts as bus master	●	○	●	●	●	○	○	○
Includes local frame buffer	●	●	○	●	●	●	●	●
Maximum power draw (in watts)	17	10	8.5	10	4.5	16.8 [1]	18.75	19.15
Supports GWorld	●	○	○	●	●	○	○	○
Supports AppleColor monitor	●	●	●	●	●	●	●	●
Large monitors supported	none	none	19	16, 19	none	15, 16, 19, 21	15, 19	none

● = yes, ○ = no or none

[1] *Power draw is for board with a 21-inch monitor. When board is used with the 13-inch AppleColor monitor, power draw is 13.73 watts.*

DirectColor/GX only works with the AppleColor monitor or compatibles, and as such competes directly with the 8•24 GC, SuperMac's Graphics Accelerator, and the RasterOps 24S. The 8•24 GC offers the best performance, at a higher price than the DirectColor/GX, the Graphics Accelerator, or the 24S. The DirectColor/GX and the Graphics Accelerator are nearly equal in price and performance, but the DirectColor/GX requires half the power of the Graphics Accelerator.

What Not to Expect

No doubt about it, the speed of any of these boards is impressive. But don't expect miracles. Some applications such as Photoshop and AutoCAD don't use QuickDraw. Illustrator bypasses much of QuickDraw—Adobe wrote its own rasterizing routines to get lines on the screen. Once an image's lines are on the screen Illustrator does use QuickDraw calls. Also, don't expect a performance increase for disk-bound operations. For instance, Photoshop spools all its images from disk. Only a RAM disk, such as the one on the RasterOps Accelerator, can speed up such operations.

Don't expect to render 3-D images in record time, either. Rendering is computation intensive; you'll need a Macintosh IIfx. Finally, there's no QuickDraw call for graduated fills—another time-consuming task that we'd like to see accelerated.

Sorting through the Accelerators

For those who work with 24-bit images frequently, any of these boards is a good investment. Which product you choose should be based largely on the Mac configuration you use. For instance, boards from SuperMac and Apple draw nearly twice as much power as do boards from RasterOps and Radius. That's fine for users who have a Mac II, IIx, or IIfx with a beefy 230-watt power supply. Even users with a IIcx or IIci might not run into problems (Apple has a reputation for rating power supplies conservatively). But Mac IIsi owners will definitely want a low-power solution—this new Mac has only a 47-watt power supply.

For sheer speed, Apple's 8•24 GC is the clear winner. It consumes a fair amount of power. Still, I highly recommend it for anyone using the AppleColor display with any Mac but the IIsi.

Radius's DirectColor/GX is an excellent alternative to the 8•24 GC. It includes 24-bit video circuitry, it easily meets Apple's recommended power limits, and it costs $900 less than the 8•24 GC. Although the DirectColor/GX doesn't support GWorld now, Radius is committed to supporting it in the future. The RasterOps 24S also looks like a promising new entry.

Users who already have a 24-bit board running an AppleColor monitor will find a cost-effective solution in the RasterOps Accelerator. I'd also pick this board if I already had a RasterOps 19-inch display system with either an 8-bit or a 24-bit board. Likewise, users who have already bought Radius's system will get the most for their money by adding the QuickColor board. Both the Accelerator and the QuickColor are well-designed boards that use very little power. But they aren't the answer for users running low on extra NuBus space—each board requires its own slot in addition to the slot for the 24-bit video board.

For users who are assembling a large-screen 24-bit system and who plan to run the boards on a Mac II, IIx, or IIfx, I recommend SuperMac's Spectrum/24 PDQ. This speedy board supports a variety of monitors from the 13-inch AppleColor to SuperMac's 21-inch display. Owners of the lower-powered Mac IIcx, IIci, or IIsi will either need to use this board with a smaller 15- or 16-inch display (the PDQ draws less power when used with a smaller monitor) or should opt for the AppleColor monitor with either the 8•24 GC or the DirectColor/GX. Mac IIcx and IIci owners who want a 19-inch display should check out the RasterOps Accelerator or Radius QuickColor, keeping in mind that these solutions require two slots. No board is perfect, but any board is better than none for users who want to work in 24-bit mode. ■

See *Where to Buy* for contact information

Just what is the difference between Photoshop and ColorStudio?

PICTURES PERFECTED

BY LON POOLE

Photographs don't lie—or do they? In 1962 U.S. ambassador to the U.N. Adlai Stevenson produced aerial reconnaissance photos during an emergency session of the United Nations Security Council as proof that the USSR was installing medium-range missiles in Cuba. Even if U.S. intelligence agencies had had the technology in 1962 to paste bogus missile silos into reconnaissance photos, few civilians would have suspected such a ploy. Twenty years later *National Geographic* did have the necessary technology, and the magazine caused considerable consternation among media critics when it used an image editing system to slide two of the pyramids of Giza together so they would both fit on the cover.

Though such exploits are the exception in journalism, over the last 15 years technological tinkering with photographs has become a common practice among certain types of designers. Ad agencies in particular have learned to rely on million-dollar computerized imaging systems made by Scitex, Crosfield, Hell, and others, to bring us their ever more dazzling visions of consumer heaven.

Today, full-color electronic image manipulation can be accomplished without a six- or seven-figure investment by using a Macintosh running Adobe Photoshop or Letraset's ColorStudio. Right now Photoshop is the more popular of the two. The reason is simple: price. When ColorStudio went on sale for $1995, it was a great bargain compared to those million-dollar image-editing systems. Two months later, however, Photoshop came out at $895. Letraset stuck with ColorStudio's price for nine months, while trying to convince everyone that theirs was a higher-caliber product than Photoshop. Adobe, meanwhile, contended that Photoshop could do everything ColorStudio could do, if not more, and was easier to use as well. Last September Letraset reduced the price of ColorStudio to $995, tacitly admitting the program's functional similarity to Photoshop. Even before this price reduction, *Macworld* decided to blow away the smoke surrounding the two companies' claims and counterclaims to find out how good ColorStudio and Photoshop really are.

Users

How better to compare ColorStudio and Photoshop than to observe experts using these programs to complete a sample electronic imaging assignment? With this plan in mind, *Macworld* editors Luis Camus and Suzanne Stefanac devised an assignment that embodied several common electronic imaging tasks. They invited the people who designed and programmed the products—Tom Hedges and Mark

MICK WIGGINS

Zimmer for ColorStudio; John Knoll and Tom Knoll for Photoshop—to complete the assignment, each team working without the other present.

Watching the two teams work, we realized it wasn't fair to pit programmers Zimmer and Hedges against John Knoll, a 10-year veteran at creating visual effects for movies and television. So we also asked Tony DeYoung, at the time Letraset's West Coast evangelist for ColorStudio, to tackle the sample assignment using ColorStudio. Although he is not a visual-effects professional like John Knoll, DeYoung had learned a lot about image processing by supporting high-end ColorStudio users such as NBC and ABC. "San Francisco, Montana" details the assignment and the work both teams did to complete it.

Uses

The tests demonstrated that ColorStudio and Photoshop are both capable electronic imaging programs. You can use these Mac programs to repair, combine, and enhance scanned 24-bit images. In addition, you can correct an image's colors, brightness, and contrast as well as paint original artwork. The programs also print color proofs and four-color separations. Image size is limited not by the amount of available RAM but by available disk space and system performance. You need lots of both. Scanned color images can easily eat up 5 megabytes of disk space apiece, and 20MB to 40MB is not unheard of. When you're editing an image in either program, the image's disk space requirements can expand by roughly three times. Working with that much occupied disk space takes time. Five-second delays are common and 20-second delays not unusual on a Mac IIcx. Some Photoshop and ColorStudio users increase RAM to 32MB with expensive 4MB Single Inline Memory Modules (SIMMs) to improve speed by decreasing disk-space needs. To use ColorStudio or Photoshop you need at least a Mac IIcx or IIsi with 8MB of RAM, a 150MB hard drive, and some type of removable high-capacity storage media.

Despite basic similarities, the two programs aren't identical (see "Image-Editing Features"). To learn more about the differences, we asked the programming teams to meet and debate the respective merits and deficiencies of their programs. For starters, we wanted to know what the programmers expected people to do with the programs. ColorStudio's Tom Hedges replied, "ColorStudio tries to address color prepress of images up to 8½ by 11, or maybe even a two-page full-bleed image. Realistically, we can't do poster-size color images." He maintained that images requiring hundreds of megabytes of disk space exceed the Mac's capabilities. As for image quality, Hedges said, "Certainly ColorStudio is up to the quality of most sheet-fed jobs and most web-offset jobs."

DRAKE SOREY

Tom Knoll (left) and John Knoll, creators of Photoshop.

Hedges noted that unlike Photoshop, ColorStudio isn't suited for editing black-and-white images. "ColorStudio is oriented toward serious color work, particularly printed color output, although some people are using it for screen-only stuff." That inspired partner Mark Zimmer to contend that their competition was overly concerned with video users.

Photoshop's John Knoll quickly countered: "Photoshop's intention is much broader. It's intended to be a very powerful and easy-to-use tool for everyone from naive users to the top of the high end. It's intended as *the* image-editing tool, to let you do anything you want to with a picture."

Environment

Photoshop should definitely feel comfortable to ordinary Macintosh users because it has a fairly traditional Mac interface. You access Photoshop's primary functions through a floating tool palette and through hierarchical menus. There are also floating palettes for selecting a color and a brush shape. You set options and access secondary functions through conventional dialog boxes. Some dialog boxes can be moved so you can see the image while you make settings and select options, but you must close a dialog box before you can do other work on your image.

ColorStudio feels awkward at first because functions aren't quite where you expect to find them. For example, what appears to be a lasso for making selections is actually four selection tools. Double-clicking on the lasso opens a dialog box in which you select the tool you want: lasso, polygon, oval, or magic wand (for making automatic selections). On the whole, ColorStudio uses fewer dialog boxes and more floating palettes than Photoshop does. If you have enough screen real estate, you can leave lots of palettes open and have quick access to their settings and options. To really take advantage of this feature, though, you need a big, expensive 24-bit color monitor, or at least two small ones. ColorStudio's palettes don't have to float above the image window, an unusual trait I found very useful with my single 13-inch monitor. You can bring the image window in front of the palettes and still use any protruding parts of palettes.

Tools

The two programs' tool palettes are organized differently but offer largely equivalent painting and retouching features. Photoshop has more selection options, transformations, and filters. ColorStudio has more painting-tool flexibility, fill options, and painting-tool pens (a pen determines the shape and size of a brush or other tool). In addition to the many pens that come with each program, you can define one custom pen in Photoshop, and an unlimited number in ColorStudio. Both programs let you capture a pattern for a custom pen from the

SAN FRANCISCO, MONTANA

Montana Sky

SF Skyline

The Assignment

"Move San Francisco to the Montana countryside," we told the ColorStudio and Photoshop teams when they arrived to complete an electronic imaging assignment using their respective programs. We gave them color scans of two photographs, *Montana Sky* (far left) and *SF Skyline* (near left). Both scans were made using a Barneyscan 35mm slide scanner. We asked the teams to flip the Montana sky left to right and to remove the tree (there was a scratch that needed touching up as well). We also wanted them to remove the tree branches from in front of the buildings in the San Francisco skyline and to drop the buildings behind the hill at the right side of the Montana sky image. We expected the work would take about two hours.

The Photoshop team included John Knoll and Tom Knoll, creators of the program. The creators of ColorStudio, Tom Hedges and Mark Zimmer, also completed the assignment. For reasons explained in the main story, ColorStudio's Tony DeYoung also completed the test, and his work is shown here.

Detail, before

Detail, after: Photoshop

1. Remove tree, fix scratch

Photoshop John Knoll removed the tree by covering it with several blobs of sky copied from the surrounding area. He selected an irregular region with the lasso, feathering the selection five pixels to diffuse its edges, and dragged away a copy of the selection. To maintain a realistic grass line, Knoll selected a section of grass and sky and slid copies of it randomly along the skyline. To retouch a scratch in the grass area, he used the Rubber Stamp to paint with a clone of the nearby grass.

ColorStudio Tony DeYoung repaired the scratch in the grass with the Brush tool set for a small pen. By setting the Brush tool's Paint Using option to Part of Image he was able to paint over the scratch with undamaged grass cloned from the vicinity. He changed the pick-up point for the cloning several times to avoid repeating patterns in the cloned grass. To remove the tree, DeYoung first set the lasso to make feathered selections. Then he repeatedly lassoed irregular regions of sky and dragged copies over the tree, as did Knoll.

Detail, before

Detail, after: ColorStudio

2. Remove trees from in front of buildings

Photoshop Knoll used the Rubber Stamp tool to cover tree branches with clones of nearby building parts. He covered large areas by copying big chunks of similar textures and adjusting the contrast and brightness levels of the copies to match their surroundings. He relied heavily on the Undo command.

ColorStudio DeYoung cropped the photo by using the Open Other command's Preview feature. He painted over the tree branches using clones of nearby buildings, changing the cloning pick-up point frequently to avoid noticeable changes in luminance. Whenever he needed to change the brush size, he clicked in the omnipresent color palette. Finally, he used Color Change to match the luminance of the cloned areas to their surroundings.

image. When you create a pen in ColorStudio, you can also specify how its size, opacity, or both will change as you paint a stroke.

Painting tools in Photoshop and ColorStudio respond to pressure-sensitive pointing devices such as the Wacom tablet. The amount of pressure on the stylus controls the pen size or paint-flow rate, depending on the tool you've selected. "Pressure-sensitive pens are the future," John Knoll remarked. Hedges added, "But with the tablet, the graphic arts–type will appreciate ColorStudio's more sophisticated painting structure. We've heard that those who use both programs tend to prefer to do their painting in ColorStudio." Tom Knoll conceded that that may have been true in the past, but said Photoshop now has an edge. "You can paint as fast as you like and not worry about virtual memory delays," he said. "Photoshop will track the stylus correctly."

Painting and retouching tools can do a lot with a scanned image, but they can't draw and edit graphic objects made of bezier curves, as Adobe Illustrator's tools can. Nor can they add PostScript-quality text to the image. You might want these capabilities for creating a poster based on a scanned image, for example. You can add bezier curve and PostScript capabilities to ColorStudio by installing Letraset's intriguing Shapes plug-in module. You install Shapes (and other ColorStudio options) using a utility program that looks and works like Apple's Font/DA Mover.

Installing Shapes adds seven new tools to the ColorStudio tool palette. You use these tools to draw bezier curves and geometric objects and to type text in a separate drawing layer above the image layer. Drawing and editing graphics is similar to working in Illustrator or Aldus FreeHand. Entering and editing text is different. The Shapes text tool works with one Adobe Type 1 PostScript font at a time; it has no conventional Font menu. Using multiple fonts is tedious because switching fonts involves waiting while Shapes imports the font outline from disk. Entered text can't be edited as text, but you can move and reshape each character as a graphic object. You can either keep the Shapes layer separate from the image or you can have ColorStudio render it to the image or mask layer with antialiased edges.

Shapes was available only in prerelease form (to any registered ColorStudio owner) at press time. Letraset expected to formally ship Shapes in October 1990. The module is free to everyone who bought ColorStudio before December 31, 1990, except people who got the program packaged with another product such as a scanner. The latter group and anyone who buys ColorStudio after the end of 1990 can buy Shapes separately at the suggested retail price of $295.

DRAKE SOREY

Mark Zimmer (left) and Tom Hedges, creators of ColorStudio.

Masks

In both programs you can protect areas of the image against painting and retouching tools by creating a mask (also called a mat). A mask acts like a stencil laid on top of the image; tools affect only the areas of the image accessible through cutouts you make in the mask. The cutouts can have hard edges or soft edges, depending on whether you want to have the tools' effects stop abruptly at the mask's edge or attenuate gradually.

Masking also facilitates making composite images. When you paste a clipping, only the parts of it that show through the mask cutouts will be deposited on the image. In other words, the clipping appears behind masked areas and in front of unmasked areas. In Photoshop you see just an outline of the clipping as you drag it around before depositing it on the image. ColorStudio renders the clipping completely, so you can more easily align it before depositing it.

A mask's effectiveness is directly related to how carefully the mask has been made. A sloppy mask leaves lines or other visible transition areas, while a precise mask yields undetectable transitions. You make a mask by selecting parts of the image you want protected and copying them to a separate mask layer. You can also create and edit a mask by painting directly on the mask layer. You can see the image while selecting parts of it, but only ColorStudio lets you paint the mask while viewing the image beneath. It's often possible in either program to generate a nearly exact mask without seeing the image and mask together, by extracting features of the image. However, the methods for doing so aren't obvious, and the manuals don't explain them.

These advanced mask-generation methods involve having the program arithmetically or logically combine components of the image (usually red, green, and blue components) with one another and with intermediate stages of the mask. Calculations can also be used for special effects such as a double exposure. Using calculations is more complicated than it sounds, and no one has written down any recipes for achieving specific effects. You'll need lots of experience and a solid grasp of color theory to make much use of calculations. ColorStudio offers 2 types of calculations; Photoshop offers 11.

In addition to the 3 image layers and the main mask layer, Photoshop lets you create up to 12 more layers, or channels, and save them with the image. You can use the extra channels for multiple masks or for the results of channel calculations. ColorStudio can save only one mask with each image.

Choices

Masking was an important part of the image-editing assignment, and I expected it to make a difference in the

SAN FRANCISCO, MONTANA *(continued)*

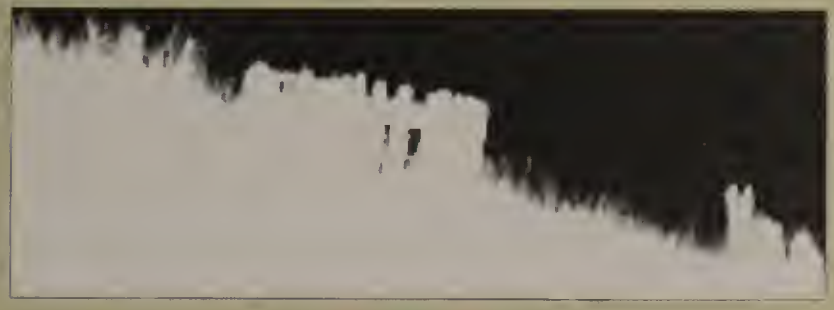
Detail, Photoshop mask

Detail, ColorStudio mask

3. Construct city mask

Photoshop First Knoll used the lasso to select the buildings to be moved. Because the buildings have straight sides, he pressed Option while lassoing to force a straight-sided selection. Next he feathered the selection one pixel and copied it to the alpha channel, making a black-and-white mask. The feathering will later soften the transition between the edges of the buildings and the Montana sky. To further improve the transition, Knoll used the Line tool to draw white antialiased lines along the diagonal edges. Antialiased lines are smooth no matter what the angle, whereas feathering only blurs the sawtooth edges of diagonal lines.

ColorStudio DeYoung took advantage of the Shapes module to draw the mask as a PostScript graphic. First he outlined the mask using the pen tool. Then he filled the shape with black and rendered it to the mask layer with fully antialiased edges. He touched up the mask while viewing it and the buildings together, with the mask color set to Blue Replace (as shown).



Detail mask, Photoshop

Detail mask, ColorStudio

4. Construct grass mask

Photoshop Knoll was able to exploit color differences to extract the mask. He began by looking for the color channel with the most contrast between sky and grass and found it in the red channel. He copied the red channel to a new channel. Then he heightened the contrast by brightening the grass to get a good edge and darkening the sky.

ColorStudio Initially, DeYoung used the lasso to select the grass below its wispy ends, but disliked the results. So he used the Color Change command to drop out the sky by replacing all blues with white. Next he changed to black everything that wasn't white. Then he copied the results to the mask layer. Finally, he used the Blur filter several times to diffuse the edges of the mask.

Detail, Photoshop

5. Place city in Montana

Photoshop In the retouched San Francisco image, Knoll used the Alpha>> Selection command to select the buildings based on the city mask. He copied the selection and switched to the retouched Montana image. There he used Alpha>> Selection again to select the hillside based on the grass mask. He pasted the city behind the selected hillside by using the Paste Behind command, then dragged the pasted city into place. Because the edges of the buildings contained some sky color from

IMAGE-EDITING FEATURES

	ColorStudio 1.1	Photoshop 1.0.6
Price	$995	$895
Minimum system	Color Mac with numeric coprocessor, 4MB RAM, 40MB hard drive	Mac SE, 2MB RAM, hard drive
Image compression	●	○ [1]
Zoom	± 16x	± 16x
FILE TYPES [1]		
TIFF/PICT/EPS	●/●/save	●/●/●
Amiga/GIF/TARGA/Pixar	○/○/○/○	●/●/●/●
MacPaint/PixelPaint/Thunderscan	○/○/○	●/●/●
Crosfield/Quantel/Scitex	●/●/●	○/○/●
PRINTED OUTPUT		
PostScript/QuickDraw devices	●/●	●/●
Color separations	●	●
Trapping	○	●
Set print angle and frequency	●	●
Adjust for dot gain	●	●
Adjust black generation	○ [2]	●
COLOR		
Color modes	CMY, RGB, HSV	RGB, HSB, HSL, CMYK, Indexed 8-bit [3]
Gray-scale modes	○	256 grays or b and w
Pantone matching	●	○
Equalize contrast	●	●
Adjust hue, saturation, brightness, contrast, gamma	●	●
Analyze colors graphically	●	●
Remap colors graphically	●	●
Save color-correction settings	●	●
SELECTING		
Lasso, rectangle, polygon, oval	● [1]	●
Autoselect, set sensitivity	● [1]	●
Edit selection	● [1]	●
Feather/defringe	●/○ [1]	●/●
PAINTING		
Brush, airbrush, and pencil	●	●
Set opacity, fade, buildup, and repeat	●	●
Paint with palette color, pattern, color of pen, image color at start of stroke, or colorized image	●	●
Darken, lighten, or color only	●	●
Save paint-tool settings	●	○
Blur, sharpen, smear	●	●
Standard/custom pens	43/unlimited	16/1
Capture/compute custom pens	●/●	●/○
Clone image	●	●
Edit text in place	●	○
Graduated fill	●	●
Set fill tolerance	●	●
MASKS AND CHANNELS		
View mask over image	●	○
Masks saved per image	1	13
Mask channels	1 [4]	13
Channel calculations	2	11
EFFECTS		
Filters	14 [1]	28 [1]
Rotate, scale, flip, crop	● [1]	●
Invert, posterize	● [1]	●
Skew, stretch	● [1]	●
Perspective, distort	○ [1]	●

[1] Available or augmentable through plug-in modules. [2] Must use Letraset's ColorCalibrator program to change printer settings. [3] Photoshop's CMYK, HSB, and HSL modes can be viewed only one channel at a time. To see the image in color, it must be converted to RGB mode. [4] Floating selection has a separate mask.

results. In fact, John Knoll's Photoshop mask is better than DeYoung's or Zimmer's ColorStudio masks. Knoll achieved more believable results in 1 hour with Photoshop than Zimmer and Hedges did in 2 hours and 20 minutes and than DeYoung did in 2 hours with ColorStudio. I attribute the disparity in results to Knoll's skill, though, and not to the programs' differences. I must conclude that an experienced Mac user who has no particular image-editing skills might have trouble making undetectable alterations using either program. The brand of paint, number of brushes, and type of canvas don't determine who paints the masterpiece, after all.

Which program should you buy? Prior to September 1, I would have recommended Photoshop solely on the basis of price. Today, ColorStudio and Photoshop are competent programs of equal value, and I can't pick a clear winner. I will say that if you're a professional Scitex or Quantel operator, you should buy ColorStudio because it's modeled on that type of high-end image-editing system. (You'll probably want to buy Photoshop too, for its compatibility with so many file types and perhaps its multichannel masking.) ColorStudio's impressive Shapes module, for which most people will have to pay 30 percent extra, makes ColorStudio the right choice for anyone who wants to combine PostScript drawing or text with scanned color images. But you can't go wrong with Photoshop if you're a typical Macintosh user who doesn't have a lot of image-editing experience. You'll get comfortable with Photoshop easily, and quickly get rewarding results. Yet it's not a low-end program; it won't desert you no matter how skillful you become. Just remember, your talent and acquired skill will have more effect on the quality of your image editing than will the program you buy. ■

See *Where to Buy* for contact information.

***Lon Poole** is a* Macworld *contributing editor whose latest book,* Amazing Mac Facts *(Microsoft Press, 1991), is a collection of tips based on his monthly* Macworld *column*

the *SF Skyline* image as an artifact of mask construction, Knoll used the Defringe command to replace the mixed-color fringe all around the edges of the selection with pure building color copied from just inside the edges. Because the city had a green cast, Knoll used the Adjust Levels command to correct its colors. Finally he sharpened the edges of the city a bit by using the Rubber Stamp tool to clone sky color against the buildings.

ColorStudio DeYoung used the Auto Selection tool to select the city based on the city mask in the *SF Skyline* image, and copied the selection to ColorStudio's private Clipboard. Next he switched to the *Montana Sky* image, where he selected the hillside based on the grass mask. He pasted the copied city and used the Mask Options command to place the city behind the hillside. To eliminate remaining sky color from the edges of the skyline image, he went back to *SF Skyline* and cloned the edges of the buildings to make them fatter. Then he reselected the city, recopied it, and repasted it.

Completed Project, Photoshop

Completed Project, ColorStudio

6. Four-color separations

Knoll took about an hour to complete the assignment in Photoshop. He spent another half hour cleaning up scanner artifacts in the sky. He also corrected the color to correspond to a photographic print we had of the original *Montana Sky* 35mm slide.

DeYoung spent an hour and a half completing the assignment in ColorStudio. He didn't clean up the sky or change the colors from the original *Montana Sky* scan. To make DeYoung's results easier to compare with Knoll's, ColorStudio product manager Jeff Segarra came in later and spent another hour and a half cleaning up the sky and adjusting the colors to match our photographic print.

We sent all the images from both programs—excluding the original source slides, which were separated conventionally—to Sprint Out, a New York service bureau that's well acquainted with both programs, for four-color separations on a Linotronic 300 with a RIP 3. Aside from the basic incongruity of the composition, both versions are fairly believable. However, a close comparison of the grass line in front of the buildings to the grass line elsewhere reveals the fraud.

THE 16 MILLION COLOR QUESTION

Which 24-bit display system is best?

BY CHERYL ENGLAND SPENCER

For displaying spreadsheets, word processor documents, and line art, 8-bit monitors do a dandy job. But when it comes to showing off scanned photographs or detailed artwork, an 8-bit monitor loses its luster. In order to accurately portray the colors in a photographic image, you need to step up to 24-bit color. Only then does the Mac's color palette expand from the 256 colors of 8-bit mode to the 16.7 million colors of 24-bit mode—enough to satisfy the pickiest viewer.

As the number of colors you can see increases, however, screen update speed decreases. If you plan to work with 24-bit images daily, you should purchase a monitor system that supports a QuickDraw graphics accelerator. SuperMac's Spectrum/24 boards include an accelerator as do Apple's 8•24 GC, RasterOps' 24S, and Radius's DirectColor/GX (see "Fast Color" in this issue). You should also choose a monitor that offers good image quality, a reasonable price, and appropriate resolution.

For this review, Macworld Lab tested 12 monitor systems—that is, combinations of a board and a monitor from the same company. Most boards that work with Apple's 13-inch AppleColor High-Resolution RGB Monitor can also run any of a number of inexpensive IBM PC–compatible multisyncing monitors. But the display quality is lower, possibly not even coming close to your viewing standards. If you are considering one of these alternative monitors, be sure to compare it with the Apple system via a personal viewing.

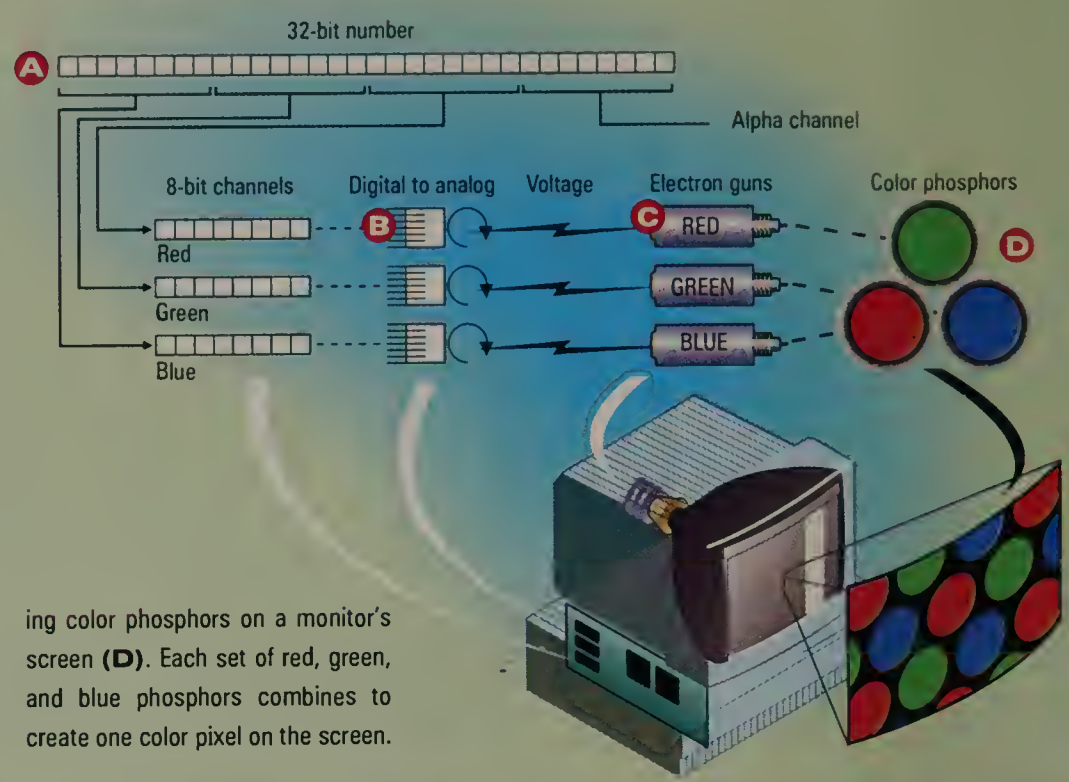
Ten of the systems we tested included monitors that measured at least 19 inches diagonally, and three of those were from one company, SuperMac. Only one company, Apple, makes a 13-inch monitor system, although RasterOps and SuperMac offer 24-bit boards specifically designed to run Apple's monitor. The only 16-inch monitor we received for testing was the MegaGraphics 16" Trinitron Display. E-Machines, RasterOps, and SuperMac also produce 16-inch monitors that work with the same boards that drive these companies' 19-inch monitors. None of these companies sent the smaller monitors since they all use a Sony picture tube like those in the larger 19-inch systems that we reviewed. The image quality on the smaller monitors should be nearly identical to that on the larger monitors.

We'll tell you up front that all the products we tested are reasonable choices. Although the boards are made by different manufacturers, most of the monitors use a Sony picture tube. Two of the SuperMac monitors, the Color Two-Page Display and the 19" Color Display, use a Hitachi tube, and both the PCPC II 19" Trinitron and the Generation X GXT CD Display monitors use an Ikegami tube. Whereas the Sony monitors all share many of the same characteristics, the PCPC and Generation X monitors look quite different from each other and from the Sony-based monitor systems. The Hitachi-based Color Two-Page Display from SuperMac stands out like a large (but not sore) thumb thanks to its warm color.

PIERRE YVES GOAVEC

Looking Behind a Color Monitor

The digital information that represents an image goes through several transformations before appearing on the Mac's screen. Each screen pixel starts life out as a chunk of 32 bits **(A)**—8 bits define red, 8 define green, and 8 define blue. The remaining 8 bits (the alpha channel) are reserved for special effects that vendors may opt to support. Lines of 32-bit information are queued up in a buffer on the video display board; the lines are separated into 8-bit chunks, and each chunk is sent to a converter that transforms it from digital to analog information **(B)**. The board electrically intensifies each analog signal, so that it can drive its corresponding electron gun **(C)**. The higher the intensity, the more saturated the color. The red, green, and blue guns fire their color signal at the corresponding color phosphors on a monitor's screen **(D)**. Each set of red, green, and blue phosphors combines to create one color pixel on the screen.



Just the Stats

Before getting caught up in image-quality issues, take a moment to consider basic factors such as what size monitor you need and what resolution it should display. The only monitor that won't take up a lot of desk space is the 13-inch AppleColor. And depending on the size of your desk, the AppleColor may be the only monitor that you can keep at arm's length (the suggested distance to reduce ELF emissions). It displays the standard 72 dpi in a 640 by 480 area for screen-to-printout accuracy.

Sixteen-inch monitors from E-Machines, MegaGraphics, and RasterOps provide a larger display area. And along with the AppleColor, these are the only monitors that can sit directly on a Mac without threatening to crush it. E-Machines offers two 16-inch monitors—one, the ColorPage T16, provides a resolution of 832 by 624 at 72 dpi while the other, the E-Machines TX, provides 87-dpi resolution. MegaGraphics' only 16-inch monitor, the 16" Trinitron Display, provides 88 dpi. The higher-resolution monitors give you the most display area for the dollar without increasing monitor bulk. In fact, MegaGraphics' 16-inch monitor displays as much information as the company's 19-inch one, albeit at a smaller size.

If the tiny text and images displayed by the high-resolution 16-inch monitors bother you, then check out the 19-inch and 21-inch monitors. There are more monitors to choose from in this size range. And there's a wider range of resolutions—from standard 72 dpi to 82 dpi. If you want to display the most area—say, two pages, margin and all—you can opt for a monitor such as the 82-dpi Radius Color Display. Or by purchasing SuperMac's Color Two-Page Display, you can get a larger monitor (21 inches) that displays a similar-size image at a larger pixel size (77 dpi). If, on the other hand, you find it more important to have a 72-dpi display, you can pick one of several 19-inch monitors. To give you a real-life idea of what these different resolutions and sizes mean, we counted the number of spreadsheet rows and columns that each monitor can display (see "Color Systems Compared").

Quality Counts

Monitor reviewers and consumers often assume that choosing a monitor based on image quality is an elusive task—after all, isn't human perception highly variable between individuals? Yet we found a high level of agreement in our group of reviewers who judged various images displayed on the monitors.And the reviewers were far from a homogeneous group—there were men and women, artists and text workers, experienced Macintosh users and novices.

So what are the characteristics that distinguish the different systems? As with 8-bit systems (which display only 256 colors), the image quality of 24-bit systems is affected by the monitor's tracking, convergence, contrast, brightness, color range, focus, and distortion. Most of these factors are closely related to each other and most depend on how well the red, green, and blue electron guns inside the monitor paint the screen.

Ideally, each electron gun fires at an intensity high enough to create pure red, green, or blue (tracking). All the electrons from each gun should also hit the exact same spot on the monitor (convergence), combining to create a perfect white on a blank screen. If either tracking or convergence is off, the screen has a slight tint. For instance, our reviewers felt that the two Ikegami-based monitors—the PCPC II 19" Trinitron

and the Generation X GXT CD—had a greenish tint, while the E-Machines T19 had a warm, pink tint. (Representatives from Generation X readjusted the GXT CD after our tests; as a result, the monitor looked more white—much of the green tint disappeared.) Macworld Lab's tracking tests show that our eyes weren't playing tricks on us—the PCPC II Trinitron's and GXT CD's green guns fired at a higher percentage than either the red or blue guns; the T19's red gun fired more intensely than its blue or green gun. Tracking imbalances become more noticeable as you turn down a monitor's brightness.

A tracking imbalance is not necessarily bad. The pinker monitors did a better job displaying flesh tones. Some people also preferred the warmth of these monitors to the starker blue-white of the Sigma ColorMax 8/24 and RasterOps 24L systems. Other people—myself included—staunchly defend the cleaner, crisper look of a blue-white display.

A slight misconvergence that gives a monitor a tint is also not necessarily bad. Intense misconvergence problems are quite bothersome—particularly in images that have lots of solid lines. Items with distinct lines or edges, such as geometrical shapes or a text highlight bar, will have a distinct color outline. Fortunately, none of the monitors tested had misconvergence problems at that level, and most monitors provide external controls for adjusting convergence should it be knocked out of whack (for instance, when you move the monitor).

PIERRE YVES GOAVEC

Two Good Choices The 19-inch RasterOps 1960 (left) has vivid colors and shows the detail in images; the SuperMac Color Two-Page Display (right) has a warm hue that displays flesh tones well.

PIERRE YVES GOAVEC

Price-to-Performance Winners Sigma Designs' ColorMax 8/24 Display (left) offers solid, overall quality for a reasonable price; the MegaGraphics 16" Trinitron Display (right) provides the most display area for the dollar and can sit directly on top of a Mac.

Range Wars

If you think really hard about a system's ability to display any of 16.7 million colors, you might come to the conclusion that the number is just another meaningless statistic. That's because the total number of colors that can be displayed at any one time is restricted by the monitor's resolution. For instance, a monitor with a resolution of 1024 dots horizontally by 768 dots vertically can—menu bars excluded—display 786,432 colors at once (that's one color per dot). Yet that's enough colors to make images appear photo-realistic. Some monitor systems offer 16-bit modes that can display up to 32,000 colors at once. You still see nearly photographic images, and the screen updates run a bit faster than in 24-bit mode.

The real reason the ability to display any of 16.7 million colors is important is because a monitor's color range can greatly affect image quality. The greater the color range, the more saturated and vivid the colors appear. Both the Radius Color Display and SuperMac's 19" Trinitron Display (with the Spectrum 24/Series III card) displayed very rich, saturated colors—but both were also dark. The darkness sometimes caused images with lots of deep colors to lose detail. On the opposite end of the spectrum, the PCPC II 19" Trinitron, Generation X GXT CD, and MegaGraphics 16" Trinitron Display have the least vivid and overall lightest colors.

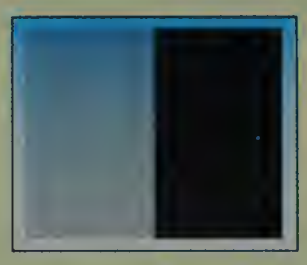
Apple's AppleColor High-Resolution RGB Monitor, the MegaGraphics 19" Trinitron Display, and SuperMac's Color Two-Page Display produce very true colors—not too dark, not too light, and not muddy. Of these three monitors, the SuperMac Color Two-Page Display has the most vivid colors. Our two favorite monitors for color range, however, are the E-Machines T19 and the 19" RasterOps 1960. Both monitors have vivid colors, good saturation, and nice brightness.

Subjectively, the reviewers found that both the E-Machines T19 and the RasterOps 1960 displays also exhibit excellent contrast, allowing lots

Testing 24-Bit Color Display Systems

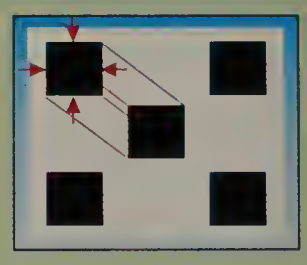
Contrast

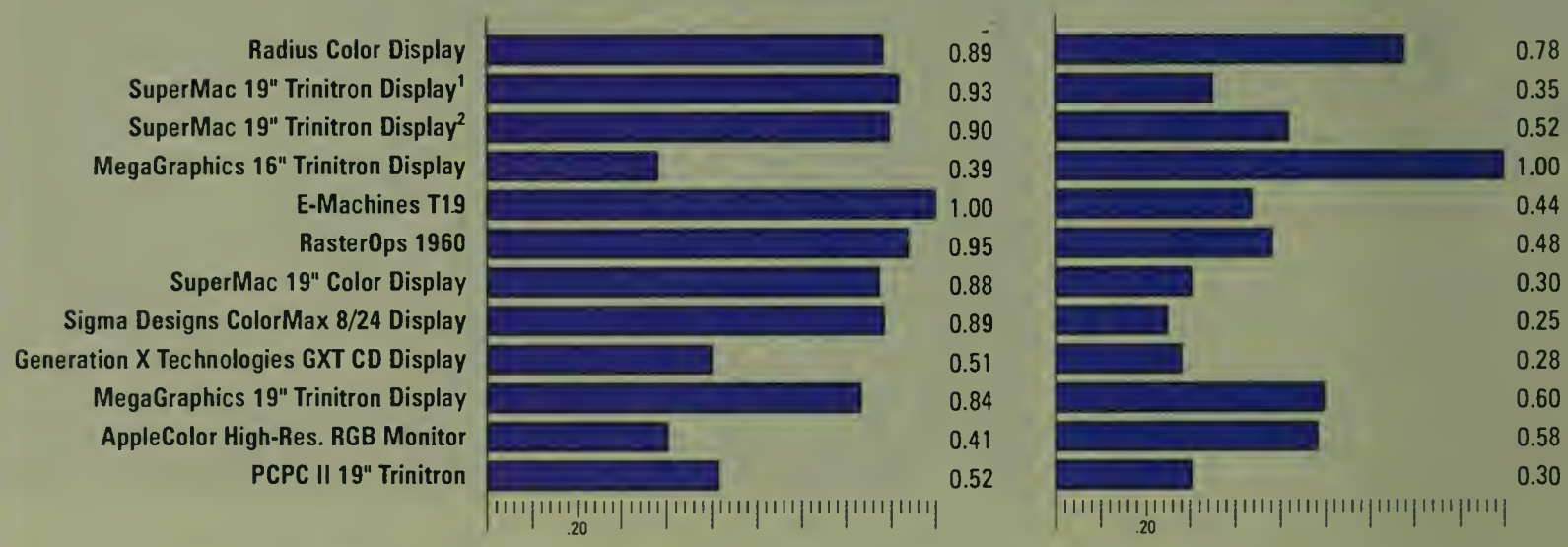
Monitors with the best contrast show a clear separation between black and white. Those with poor contrast have a white that leans toward gray and a black that isn't very solid.



Distortion

We placed perfect squares in each corner of the monitor and measured how distorted they appeared. On a good monitor, squares are square. On a poor one, they have sides of unequal length.





[1]Running with the Spectrum/24 Series III board.
[2]Running with the Spectrum/24 PDQ board.

These four tests compare the performance of 12 monitors for the imaging characteristics contrast, distortion, convergence, and tracking. In order to make the benchmark test results easy to interpret, we created an indexed number from the instrument readings. A 1.00 on this scale indicates the best results;

of detail to come through in even the most problem-plagued images (for instance, those that have very light and/or very dark areas). The PCPC II 19" Trinitron and the MegaGraphics 16" Trinitron Display have good contrast and detail in light areas, but they just can't compete on darker areas. Macworld Lab's test results indicate that the AppleColor High-Resolution RGB and the Generation X GXT CD have contrast ratings at least as low as those for the PCPC II 19" Trinitron, but our eyeball examination rates them higher.

Focus and Distortion

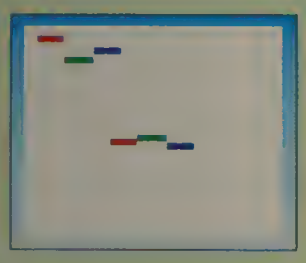
Even if most people buy a 24-bit system to work with color images, they will still need to work with text or fine lines. That's when a monitor's focus becomes important. No monitor displays perfect focus, but we really had to put our noses to the screen to feel eyestrain. Only in the far corners of the screens was the blurriness uncomfortable.

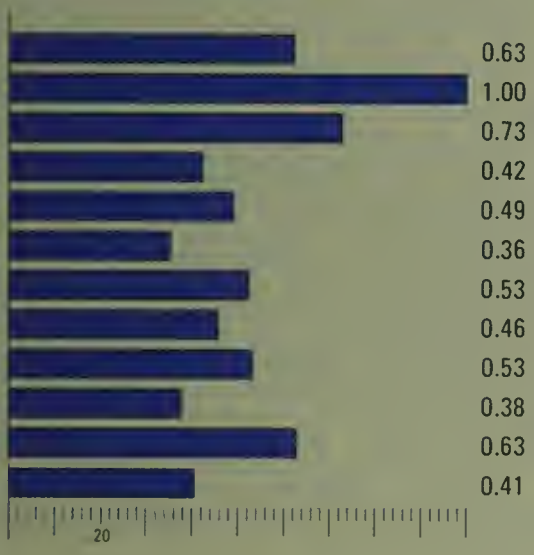
The sharpest monitors were the MegaGraphics 16" and Sigma Design's ColorMax 8/24. Both have clear text and displayed thin, parallel lines distinctly. The Sony Trinitron–based monitors from Radius, E-Machines, RasterOps, SuperMac, and Apple all have a softer focus, although they are still easily legible. Of these, the Apple is the softest, with pixels blurring slightly into one another. Before being readjusted, Generation X's GXT CD had a brown tint to the black text–I found this annoying but another reviewer commented that the brown coloring increased the apparent focus. Once adjusted, the GXT CD's black was on par with the other monitors.

All the monitors suffered a bit from distortion (for instance, the image area bowed in a bit on one side),

Convergence

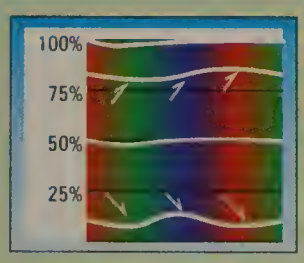
Convergence denotes how closely the red, green, and blue electron guns are able to hit on the same spot. While no monitor is perfect, those with close alignment offer a more accurate rendering of color.

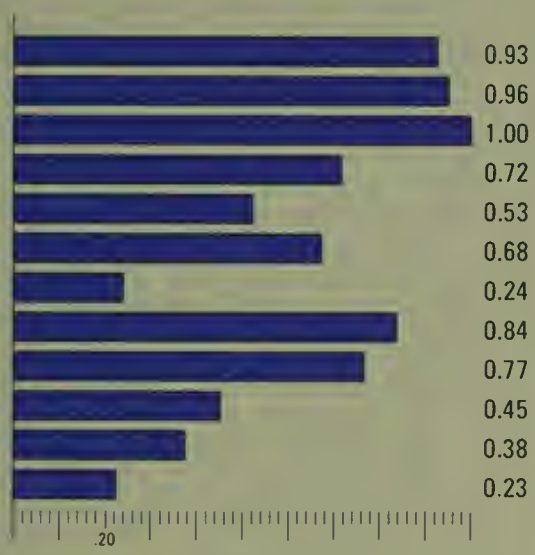




Tracking

As you lower the percentage of white displayed on the screen from 100 to 25, a monitor with good tracking maintains the equilibrium between the three electron guns. Poor tracking results in a color bias.





quality decreases as the numbers decrease. Don't base a purchasing decision solely on these numbers. Objective measurements can't tell the whole story about something as subjective as image quality. Monitors are listed in order of overall best performance.

but none were distorted to the point of being distracting. Most of the distortion problems occurred on the left side of the monitor. That's because the display signal stabilizes on the monitor's left-hand side.

The electron guns scan from left to right to paint the screen. The amount of time that the beam takes to fly back to the left-hand side and to stabilize must be balanced with an equal amount of time during which the monitor does not display a signal—the screen is literally blank. The so-called active and blanking times added together must equal the amount of time it takes the beam to go from line to line. Thus, as the refresh rate gets faster, the amount of blank screen time lessens. Although that would seem to indicate better quality, the opposite is true. The signal is so poor during the time the image is stabilizing that you end up with more distortion than you would if the screen were completely blank.

The Rest of the Details

Once you narrow your choices down to a few monitors, based on size, resolution, and image quality, you can start to zero in on the little details. Monitors from Sigma Designs and Radius come with utility software that allows you to do such things as capture screen images to a PICT file, enlarge the pointer or menus, and center dialog boxes. We don't consider any of these goodies to be a real factor in a buying decision, however. Most of this software can be procured either through a dealer or from a bulletin board for a low cost.

Some boards include the ability to create a virtual screen (where the image workspace is larger than the monitor's dimensions), and to pan (an effect where moving the cursor to the edge of the screen scrolls more of the image into view) and zoom in on images. It used to be that these features were implemented in software—but as users have upped their expectations for speed, companies have moved the features to hardware, where they run faster. In order to have a huge virtual screen, you need to run the monitor in black and white. Running a monitor in 24-bit mode requires more memory—which means the board has less memory to devote to keeping the virtual screen image in a video buffer. For instance, the Generation X GXT CD and the MegaGraphics 16" and 19" monitors can display a huge virtual screen of *8192* pixels by 1024 pixels in black and white; in 8-bit or 24-bit mode, the virtual screen size goes down to a "measly" 1024-by-1024-pixel resolution.

Some boards also include gamma-correction tables for adjusting the monitor's color balance. Usually these tables are built into the hardware, but are controlled through software. The user picks a type of gamma correction from a scrolling list. The software then tells the board how to control the electron guns based on which type of gamma correction was chosen. This option is offered mainly for boards that work with several different monitors, but it can be handy for adjusting color accuracy and balance to suit your tastes.

Board Games

If you aren't quite ready to plunk down $10,000 for a 19-inch monitor, a 24-bit board, a QuickDraw accelerator, and a color calibrator, then you'll

COLOR SYSTEMS COMPARED

Company	Apple Computer	E-Machines	E-Machines	E-Machines	Generation X Technologies	MegaGraphics	MegaGraphics
Name of board	Macintosh Display Card 8•24	E-Machines/24	E-Machines/24	E-Machines/24	Color 24gx	MegaGraphics 2024 TrueColor	MegaGraphics 2024 True Color
Name of monitor	AppleColor High-Res. RGB Monitor	ColorPage T16	E-Machines TX	E-Machines T19	GXT CD Display	19" Trinitron Display	16" Trinitron Display
Price of board	$799	$2995	$2995	$2995	$3995	$4799	$4799
Price of monitor	$999	$1995	$2395	$3895	NA[2]	NA[2]	NA[2]
Price of system	$1798	$4990	$5390	$6890	$8195	$9148	$6795
Compatible with AppleColor RGB monitor	NA	no	no	no	yes	yes	yes
Dimensions (w × h × d, in inches)	13.5 × 14.5 × 14.5	15.9 × 14.9 × 18.7	15.9 × 14.9 × 18.7	18.7 × 18.8 × 21	18.9 × 19.25 × 20.71	19 × 19 × 20	16 × 16 × 18
Diagonal size (in inches)	13	16	16	19	19	19	16
Picture-tube manufacturer	Sony	Sony	Sony	Sony	Ikegami	Sony	Sony
Resolution (w × h, in pixels)	640 × 480	832 × 624	1024 × 808	1024 × 808	1024 × 768	1024 × 826	1024 × 826
Pixel density (in dots per inch)	72	72	87	76	72	75	88
Spreadsheet image size (rows × columns)	29 × 8	not tested	not tested	54 × 13	51 × 13	55 × 13	55 × 13
Vertical refresh rate	66.7Hz	67Hz	72Hz	72Hz	75Hz	69Hz	69Hz
Screen depths supported	1, 2, 4, 8, 24	1, 2, 4, 8, 16, 24	1, 2, 4, 8, 16, 24	1, 2, 4, 8, 16, 24	1, 8, 24	1, 8, 24	1, 8, 24
Hardware virtual screen	no	no	no	no	yes	yes	yes
Hardware pan and zoom	no	no	no	no	yes	yes	yes
Gamma correction	[illegible]	yes	yes	yes	yes	yes	yes
QuickDraw accelerator available	yes[3]	yes[4]	yes[4]	yes[4]	no	yes[4]	yes[4]
Warranty (in years)	1	1	1	1	1	1	1
Extended warranty available	no	yes	yes	yes	no	yes	yes
price per year	NA	$325	$325	$325	NA	15% of invoice	15% of invoice
maximum number of years	NA	1	1	1	NA	2	2
8-bit–to–24-bit upgrade policy							
memory expansion kit (price)	$349	no	no	no	no	no	no
rebate or trade in	no	yes[5]	yes[5]	yes[5]	no	$900 (2008 card)	$900 (2008 card)

[1] *SuperMac's Spectrum/24 PDQ board works with both the 19" Trinitron Display and the Hitachi-based 19" Color Display.* [2] *Not sold separately.*
[4] *The company does not make its own accelerator; a compatible accelerator must be purchased from another company.* [5] *Only valid for users who purchase the extended warranty.*

be glad to know that most companies offer a lot of flexibility in purchasing a system. For instance, some companies let you buy an 8-bit board initially and then later upgrade to a 24-bit system. The upgrade can take one of two forms—adding more memory or trading in the old board for a new one. For instance, 8-bit boards from Sigma Designs and Radius can be upgraded to 24 bits by adding extra video RAM. (Don't think you are going to get any $50-per-megabyte DRAM-type deals, however—video RAM upgrades are pricey.) MegaGraphics offers a $900 rebate for trading in its 8-bit 2008 board for the 24-bit 2024 TrueColor board. RasterOps combines both approaches—the 24L can be purchased as an 8-bit board and then later upgraded to 24 bits by adding memory and ROM. The company also offers an upgrade path for users who still have early RasterOps products.

Two companies, Generation X and SuperMac, make an effort to support as many monitors as possible. Boards from these companies contain additional oscillators that make the boards' timing compatible with a wide range of monitors. For instance, both companies' boards work with 13-inch monitors from NEC and Seiko as well as with popular 19-inch monitors such as the Mitsubishi DiamondScan. For offices that already have an installed base of monitors, the Generation X and SuperMac boards provide an easy upgrade path. Since these boards come with the oscillators built in, you just need to move a jumper or set a DIP switch in order to choose the appropriate timing. Some of the other monitor companies sell additional oscillators that can be added to their boards. But in order to do this you must either go through a tricky installation process or pay a dealer to do it for you.

The problem with using one of these widely compatible 24-bit boards to support just any monitor is that you will notice a degradation in the image quality. That is because the electronics on such a board are not optimized to run with just one particular monitor—in order to get the flexibility, these boards' specifications are general.

PCPC	Radius	RasterOps Corporation	RasterOps Corporation	Sigma Designs	SuperMac Technology	SuperMac Technology	SuperMac Technology	SuperMac Technology
CGC II/24	DirectColor/24	RasterOps 24L	RasterOps 24L	ColorMax 8/24 Display Adapter	Spectrum/24 Series III	Spectrum/24 PDQ[1]	Spectrum/24 PDQ[1]	Spectrum/24 Series III
PCPC II 19" Trinitron	Radius Color Display	RasterOps 1960	RasterOps 1650	ColorMax 8/24 Display Monitor	19" Trinitron Display	16" Trinitron Display	Color Two-Page Display	19" Color Display
$1979	$3595	$3995	$3995	$2395	$3999	$4999	$4999	$4999
$2879	$4295	$4195	NA[2]	NA[2]	$4200	$2800	$4799	$3200
$4858	$7890	$8190	$6990	$6695	$8199	$7799	$9498	$8199
yes	no	yes	yes	no	yes	yes	yes	yes
18.9 × 19.5 × 20.7	19 × 18.8 × 21.1	19 × 19 × 20	16 × 16.5 × 17.5	18.9 × 18 × 22.2	18.9 × 18.7 × 21.1	16 × 15 × 18.7	19.2 × 18.4 × 20.4	18.9 × 18.7 × 21.1
20	19	19	16	19	19	16	21	19
Ikegami	Sony	Sony	Sony	Sony	Sony	Sony	Hitachi	Hitachi
1024 × 768	1152 × 882	1024 × 768	800 × 600	1024 × 768	1024 × 768	832 × 624	1152 × 870	1024 × 768
72	82	72	72	72	72	72	77	72
51 × 13	60 × 14	51 × 13	not tested	51 × 13	51 × 13	not tested	59 × 14	not tested
75Hz	71Hz	75Hz	67Hz	79Hz	75Hz	75Hz	75Hz	75Hz
1, 2, 4, 8, 24	1, 8, 16, 24	1, 2, 4, 8, 24	1, 2, 4, 8, 24	1, 2, 4, 8, 24	1, 2, 4, 8, 24	1, 2, 4, 8, 24	1, 2, 4, 8, 24	1, 2, 4, 8, 24
no	no	yes	yes	no	yes	no	no	no
no	no	yes	yes	no	yes	no	no	no
yes	yes	yes	yes	yes	yes	yes	yes	yes
yes[4]	optional	optional	optional	yes[4]	included	included	included	included
1	1	1	1	1	1	1	1	1
yes	yes	no	no	no	no	no	no	no
$895	$442	NA	NA	NA	NA	NA	NA	NA
5	2	NA	NA	NA	NA	NA	NA	NA
no	$1790	$1995	no	$500	no	no	no	no
yes	no	no	yes	yes[6]	yes	yes	yes	no

[3] *Macintosh Display Card 8•24 GC includes 24-bit color and QuickDraw acceleration on one board.*

[6] *Users with older, nonupgradable 8-bit boards can swap them for upgradable 8-bit boards for $100.*

If the Systems Are All So Good . . .

If you've already got an 8-bit board and monitor system that you like, and if you can get a good deal on a trade-in or can add more memory to make the board you have capable of 24-bit mode, then by all means do it. You'll come out a cost winner. Budget-minded buyers should also check out the AppleColor monitor with the RasterOps 264 ColorBoard or Apple's own 8•24 board. You don't necessarily need a 19-inch monitor in order to work efficiently with 24-bit images.

From purely a quality standpoint, we liked the E-Machines T19 best, with the 19-inch RasterOps 1960 coming in close behind. Both had vivid, accurate colors and both displayed a lot of detail in a wide variety of images. The E-Machines T19 is the less expensive of the two, and E-Machines offers users an extended warranty (RasterOps is planning to offer an extended warranty in the future). The RasterOps 1960 supports a RasterOps-labeled QuickDraw accelerator, while E-Machines depends on Radius and Apple to supply acceleration for the T19.

Sigma Designs' ColorMax 8/24 Display is the price-for-performance leader this time around. This solid monitor comes close to the T19 and RasterOps 1960 in quality, but beats them both in price. In addition, Sigma offers an excellent upgrade path for its past customers.

Picking a few favorites is a difficult task. I'm tempted to keep on recommending products—after all, the SuperMac Hitachi-based monitors had that nice warm color, the Generation X and SuperMac boards work with so many different monitors, and the MegaGraphics 16" Trinitron Display is such an attractive size. Even more difficult is singling out our least favorite products. The PCPC II 19" Trinitron was, however, last on everyone's list (in spite of its low price) because of the lackluster colors and loss of detail. All in all, we had to be pickier than ever before to choose the best—and worst—display. ◻

See *Where to Buy* under the heading 24-Bit Display Systems for contact information.

NEXT ON THE

Three new systems promise to enhance Next's standing in the personal-computing arena

by Bruce F. Webster

In October of 1988, Steve Jobs introduced the most anticipated and controversial computer system since the original Macintosh: the Next system. That system, described at length in the January 1989 issue of *Macworld,* represented a new evolutionary step in personal computing. Features introduced with that system have been showing up on the Macintosh platform (not to mention others) ever since. Note, for instance, Apple's "coincidental" official interest in 3-D icons, object-oriented programming, and built-in sound digitizing. Still Next has had a hard time selling systems due to perceived and real limitations, such as lack of commercial software, high entry cost, and sluggish performance.

No one can say that Next doesn't learn from its mistakes. At its second major rollout, on September 18, 1990, the company introduced a line of systems that are not only more powerful but also less expensive than the original machine. The high-resolution gray-scale display is now complemented by two color systems. Next also got the CEOs of two of the three largest personal-computer software companies—Jim Manzi of Lotus and

The new Next CPU line includes, from left to right, the [illegible], the Nextstation Color, and Nextcube.

AGENDA

Alan Ashton of WordPerfect—to introduce their products for the Next (Improv and WordPerfect, respectively). And in an effort to quell criticism of the machine's small installed base, Next announced that it already had orders on the books for over 15,000 new systems.

What Was All the Hoopla About?

The Next product line now consists of three basic systems: the Nextstation, the Nextstation Color, and the Nextcube. In addition, the line includes the MegaPixel Display, the Next 400 dpi Laser Printer (at a reduced price), and—the real showstoppers—the Nextdimension 32-bit graphics/video board and the 16-inch MegaPixel Color Display.

All three of the Next systems share the following features:

- a 25MHz 68040 processor serving as the central processing unit (CPU), the memory management unit (MMU), and the floating point unit (FPU)
- a 25MHz 56001 digital signal processor (DSP) with 24K of static RAM, expandable to 576K
- 16 SIMM sockets for main memory, capable of accepting either 1MB or 4MB SIMMs, with parity memory as an option
- Next's two VLSI "mainframe" chips, implementing eight I/O processors (nine on the Nextcube) and other system features
- on-board video with separate video RAM, generating an 1120-pixels-by-832-lines image and providing full alpha-channel support
- built-in Ethernet hardware with external connectors for both thin-wire (BNC T-connector) and twisted-pair (10 Base-T) cabling, the latter able to support Ethernet connections over standard phone wires
- a 2.88MB 3½-inch floppy disk drive that also reads and writes MS-DOS disks (both 720K and 1.44MB)
- dual serial (DIN-8 RS-422) ports; dedicated video and printer ports; DSP port; and a SCSI/2 interface with both an internal and an external port
- built-in sound input (8-bit, 8kHz sampling) and output (dual-channel 16-bit, 44.1kHz sampling)
- Release 2.0 of the Next system software, which includes NextStep 2.0 sitting on top of the Mach (UNIX) operating system

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The Nextstation

The new, "low-end" Next is called the Nextstation, and at a list price of $4995, the quotation marks around "low end" probably aren't needed. Costing less than a bare Mac IIci box, the Nextstation itself, along with the features listed above, comes with a 105MB hard drive, 8MB of RAM, the Next MegaPixel Display, and the standard version of Release 2.0 system software.

The Nextstation is a flat black slab, about 15½ inches wide by 14⅓ inches deep and about 2½ inches high. The floppy drive is located in front and all ports are in the back. Inside is a single Next main logic board; it has no expansion. The MegaPixel Display sits on top of the computer.

The Nextstation has a significant advantage over the Macintosh IIsi, which Apple bills as its "cheapest modular Macintosh." A not-really-comparable Mac contender—with 8MB of RAM, a 40MB hard drive, the 68882 FPU, and the Apple Portrait Display (640-by-870-dpi resolution and 16 shades)—costs about $800 more than the Nextstation (see "Mac IIsi versus Nextstation"). Furthermore, the Mac IIsi system has only half of the Nextstation's display area, a fraction of the 68040/56001 horsepower, little bundled software, and no I/O processors or Ethernet hardware. On the plus side, the Mac IIsi system does include a single expansion slot, built-in color support, and it can take advantage of a vast number of sophisticated applications and utilities.

While the Nextstation is a complete system, it's a tight fit. Only about 30MB of disk space is available on the hard drive; but the user does have the option of deleting or archiving applications and files in order to free up space. As it is, the system software doesn't have all the items bundled with the original Nextcube; the full extended version is available only if you buy Next's larger drive (340MB) or hook up an external hard drive. Doing the latter is simple; you can hook up and format most Mac-compatible SCSI drives with few problems, although you'll need the SCSI/2-to-SCSI adapter cable sold by Next.

Because of the limited disk space, Next suggests that the Nextstation is best used on a network or with an external hard drive. This stance ignores a large number of potential end users who will want to acquire the low-end product as a compact, stand-alone unit. Unfortunately, the next-larger configuration—with a 340MB hard drive—costs $2000 more. That's too big a jump; Next should offer a system with a 160MB hard drive for $5500 or thereabouts. Even so, with a street price of around $4200 and an educational discount price of around $3000, the Nextstation may well become a strong-selling system.

The Nextstation Color

Steve Jobs could have expected demands for color when he first announced the Next system; after all, he'd already been through it once with the Macintosh. This time, however, it didn't take over three years for color to appear, and Next avoided some of the trade-offs and headaches that have plagued the history of Macintosh color, such as CLUTs (color look-up tables), palettes, and sluggish performance.

The Nextstation Color system looks identical to the Nextstation, and its basic components are the same. However, the Nextstation MegaPixel Color Display is a 16-inch Trinitron RGB monitor that offers the standard

To compare the features and prices of the Nextstation and Mac IIsi systems, I began with basic systems that include the smallest hard drives sold with each machine. All prices are manufacturer list prices, except for memory, which presumes $75 for each 1MB SIMM. Macintosh advantages in this comparison include an expansion slot, more gray shades, built-in color, and higher built-in sound-sampling rates. The Nextstation's advantages include much faster speed, a DSP chip, more bundled software, a much larger screen, alpha-channel support, and built-in Ethernet.

MAC IIsi VERSUS NEXTSTATION

	Mac IIsi System	List Price	Nextstation System	List Price
Basic System	2MB RAM, 40MB hard drive	$3800	8MB RAM, 105MB hard drive	$4000
CPU	20MHz 68030		25MHz 68040	
FPU	20MHz 68882	$200	built-in to 68040	
MMU	built-in to 68030		built-in to 68040	
DSP	none		25MHz 56001	
I/O processors	none		12 DMA I/O processors	
ROM	512K		NA	
System RAM	8MB	$600	8MB	
Built-in video	640 × 480 × 256 colors/shades 640 × 870 × 16 shades		1120 × 832 × 4 shades (plus 4 levels of alpha)	
Monitor	Apple Portrait Display (640 × 870)	$1099	MegaPixel Display (1120 × 832)	$995
Keyboard	Apple ADB Keyboard	$99	Next keyboard	
Sound input	8-bit, 11kHz or 22kHz sampling		8-bit, 8kHz sampling	
Sound-input ports	microphone jack (microphone included)		microphone jack, built-in microphone	
Sound output	Apple sound chip with built-in speaker		56001 DSP with built-in speaker	
Sound-output ports	stereo minijack		stereo minijack, dual line-outs	
Other ports	serial (2), SCSI, ADB		serial (2); SCSI/2, printer, DSP, Ethernet (thin wire and twisted pair)	
Slots	1		0	
Floppy drive	1.44MB		2.88 MB	
Built-in networking	AppleTalk		Ethernet	
System software	System 6.0.6		Release 2.0	
Bundled software	HyperCard, System utilities		WriteNow, Webster's Ninth New Collegiate Dictionary (small version), Librarian, Mail, Edit, Shell, UNIX utilities	
Total Retail List Price		$5798*		$4995

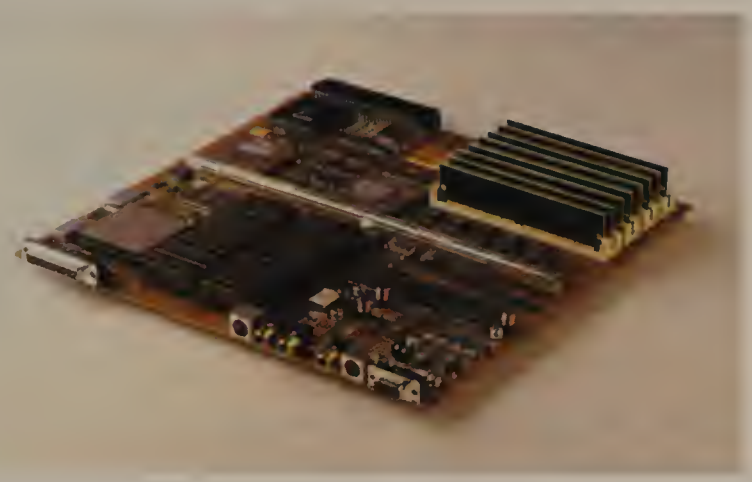
** With AppleColor High Resolution RGB Monitor instead (640 × 480), $5698.*

Next features (1120 by 832 resolution, 68Hz refresh rate, 92 dpi), while the built-in video supports 16 bits per pixel at that resolution. Unlike the standard Mac 8-bit color video, the Nextstation Color doesn't use CLUTs. Instead, a given pixel uses 4 bits each for the red, green, blue, and alpha channels, yielding 4096 simultaneous colors on the screen and 16 levels of transparency (see *State of the Mac* in this issue for a discussion of the alpha channel). System support for color includes automatic translation of images of any bit-depth, and built-in software routines using the Joint Photographic Experts Group (JPEG) algorithms for compression and decompression of color images.

You can buy the Nextstation Color without the Next MegaPixel Color Display, provided you have a monitor of your own with the proper scan frequency (68Hz). The Nextstation Color comes with a small device called the Sound Box, which converts the video signal to a standard RGB/sync output, so you can connect the Nextstation Color to the monitor of your choice. The Nextstation Color also supports the other features of the MegaPixel displays: keyboard input, built-in microphone and speaker, microphone and headphone jacks, and dual line-outs. At $2995 the Next color monitor is competitively priced (as large monitors go) and provides a sharp image.

While the Nextstation Color and the Mac IIci are competitively priced, the Nextstation Color still has a decided performance advantage, along with better color, a larger display area (almost three times bigger), a DSP chip, sound input, built-in Ethernet, and the bundled software (see "Mac IIci versus Nextstation Color"). On the other hand, the IIci's 80MB hard drive offers a lot more free space (over 70MB) than the Nextstation Color's 105MB hard drive does (about 30MB).

The Nextstation Color's 105MB hard drive really isn't sufficient; you'll probably want to buy a third-party external hard drive, or plunk down another $2000 to get the Next 340MB hard drive instead. Still, the Nextstation Color provides high-quality color and solid performance at a competitive price.



16-Million Colors on the Next With the Nextdimension board, Next users have access to 32-bit PostScript color, 8MB of RAM (expandable to 32MB), an Intel i860 graphics accelerator, video input and output, as well as real-time JPEG video compression and decompression.

The Nextcube

The original Next cube hasn't been dropped—just renamed and upgraded. It's now called the Nextcube and the redesigned main logic board has the same features as the Nextstation: 68040/56001 combination, built-in video with 1120 by 832 resolution and 4-color support, plus all the same ports. Individuals who already own a cube can even upgrade to the new main logic board for $1495. The basic Nextcube—with 8MB of RAM, 2.88MB floppy drive, 105MB hard drive, three open slots, and the MegaPixel Display—is only $7995; as with the Nextstations, you can select the 340MB hard drive instead for an extra $2000.

What has changed is the selection of mass storage options. Since the floppy drive and standard hard drive fit together in the upper mass storage bay, the lower one is free to house a variety of devices. The Next optical disc drive is still an option (for an additional $2995)—despite all the controversy that has surrounded it, the optical drive is a very popular feature among people who actually use the Next. Other options include a CD ROM drive, a 660MB hard drive, and a 1.4GB hard drive.

"Mac IIfx versus Nextcube" compares a beefed-up Nextcube system (16MB RAM, 340MB hard drive) with a comparably equipped Macintosh IIfx. This requires outfitting the IIfx with an Apple Two-Page Monochrome Monitor, extra memory (purchased at street prices, with credit for preinstalled memory), adding an EtherTalk board, and buying A/UX 2.0 on floppy disks. The Nextcube costs over $6000 less than the Mac IIfx, yet has better raw performance, twice the free disk space, built-in sound input, the DSP chip, and the extended Release 2.0 software suite, including full NextStep development tools.

Nextdimension Color Board

While the new Next systems present a significant performance improvement over the original Next cube, and for less money, they are still more evolutionary than revolutionary. The real bombshell dropped at the September 18 rollout was the Nextdimension color board. Next did a very good job of keeping many details about this board under wraps until the announcement, and with good reason: a punch is best landed when it's unexpected.

The board fits into an open slot in the Nextcube system. On its 11-by-11-inch surface, it has the following:

- video circuitry producing true 32-bit color (8 bits each for red, green, and blue and an 8-bit alpha channel for transparency for an 1120 by 832 display)
- 4MB of dedicated video RAM, and 8 SIMM sockets capable of holding up to 32MB of frame buffer RAM (the Nextdimension color board comes with 4MB)
- an Intel i860 RISC processor, rated at 80 million floating-point operations per second, running a stripped-down Mach kernel and providing graphics acceleration
- circuitry and connectors supporting NTSC, S-Video, and RGB input, allowing live video signals to be displayed in an open, movable, resizable window
- circuitry/connectors providing NTSC, S-Video, and RGB output
- a C-Cube JPEG chip, capable of compressing live color video input to

a disk (or decompressing it from a disk) at 30 frames per second, with varying degrees of compression under software control

In short, the Nextdimension color board combines the features of several Macintosh video boards put together. Next's price for this board is $3995, or less than a third of what it would cost to get roughly equivalent functionality on a Macintosh. What's more, the Nextdimension provides all this in a coordinated, integrated fashion, ensuring that these functions can be used together and are supported by standard Next system software. For example, live video coming in can be displayed in a regular window, which can be moved, resized, or hidden just like any other window. You can capture single-frame images, and then save them as color TIFF or EPS files.

As with Mac video boards, the display produced by the Nextdimension is an extension of the regular desktop provided on the MegaPixel Display. As with the Macintosh Monitors cdev, a Monitors panel in the Preferences application enables you to adjust virtual positioning of the screens, and lets you select which display is the main one. And, as with the Mac, you can plug a Nextdimension board in to each empty slot, giving you up to four displays (one gray-scale, three color) forming one large, configurable desktop.

Updated Hardware

In conjunction with the three new systems, Next is also releasing a slightly redesigned version of the MegaPixel Display. This display still offers an 1120 by 832 gray-scale screen (68Hz refresh rate, 92-dots-per-inch resolution); 84-key keyboard; microphone minijack; headphone minijack; and dual gold-plated line-outs. The display also has a CODEC chip that supports digitized sound input at an 8-bit, 8kHz sampling rate; it also has an internal speaker for sound output. New features include improved sound quality and a microphone built into the display's front bezel. The unit itself is 10 pounds lighter than the original MegaPixel due to a redesign. The MegaPixel Display is now built in the United States, at a factory located in San Diego, although the picture tube is still imported from Asia.

The Next 400 dpi Laser Printer has not undergone any significant changes, except for its price. Formerly listed at $3495, the 8-pages-per-minute printer now retails for $1795.

Release 2.0

System software Release 2.0 for the Next machines reflects much feedback from users as well as substantial discussion within Next. The most important goal for both users and developers is binary compatibility with Release 1.0; existing applications should run without modification. Next says Release 2.0 is compatible with

To compare the features and prices of the Nextstation Color and Mac IIci systems, I began with basic systems that include an 80MB hard drive for the IIci and a 105MB hard drive for the Next machine. All prices are manufacturer list prices, except for memory, which presumes $75 for each 1MB SIMM. Macintosh advantages in this comparison include three expansion slots and more available disk space. The Nextstation's advantages include faster speed, higher resolution, more colors, a DSP chip, more bundled software, alpha-channel support, sound input, and built-in Ethernet.

MAC IIci VERSUS NEXTSTATION COLOR

	Mac IIci System	List Price	Nextstation Color System	List Price
Basic System	4MB RAM, 80MB hard drive	$6669	12MB RAM, 105MB hard drive	$4875
CPU	25MHz 68030		25MHz 68040	
MMU	built-in to 68030		built-in to 68040	
FPU	25MHz 68882		built-in to 68040	
DSP	none		25MHz 56001	
I/O processors	none		12 DMA I/O processors	
ROM	512K		NA	
RAM	8MB	$300	12MB	
Built-in video	640 × 480 × 256 colors		1120 × 832 × 4096 colors (with 4-bit alpha)	
Monitor	AppleColor High Resolution RGB Monitor (640 × 480)	$999	Next MegaPixel Color (1120 × 32)	$2995
Keyboard	Apple Keyboard	$129	Next keyboard	
Sound input	none		8-bit, 8kHz sampling	
Sound-input ports	none		microphone jack, built-in microphone	
Sound output	Apple sound chip with built-in speaker		56001 DSP with Next Sound Box	$125
Sound-output ports	stereo minijack		stereo minijack, dual line-outs	
Other ports	serial (2), SCSI, ADB (2)		serial (2), SCSI/2, printer, DSP, Ethernet (thin wire and twisted pair)	
Slots	3		0	
Floppy drive	1.44MB		2.88MB	
Built-in networking	AppleTalk		Ethernet	
System software	System 6.0.6		Release 2.0	
Bundled software	HyperCard, System utilities		WriteNow, Webster's Ninth New Collegiate Dictionary (small version), Librarian, Mail, Edit, Shell, UNIX utilities	
Total Retail List Price		$8097		$7995

applications created for 1.0 as long as those applications don't bypass the system functions. However, based on my experience with a beta version of Release 2.0, I suspect there may be a rash of application updates when Release 2.0 becomes the norm.

The major change to the Mach kernel is that Next has implemented support for multithreading. An application can now divide itself up into several threads, each executing at the same time as the others. This paves the way for multiprocessor support, with each thread executing on a separate processor. As it turns out, certain features of the 68040 processor—such as its large internal cache and its ability to let go of its own processor bus—make it well suited for multiprocessing. Don't be surprised if a Next performance-accelerator board comes out, containing a lot of memory and several 68040 CPUs.

Display PostScript (DPS) is being improved and enhanced as it moves toward a merger with PostScript Level II; in fact, PostScript Level II is mostly just Display PostScript as implemented on the Next. Adobe Type Manager for DPS is bundled with Release 2.0, and support for PostScript composite fonts (such as kanji) is in place.

One interesting system-wide extension is built-in fax support. If you hook up a fax modem to one of the Next's serial ports, you can fax any document that you can print. That's because the standard Print panel has a fax button on it that when pressed brings up a phone list and allows you to select or enter the outgoing phone number. The Next machine then spools off the fax request, just as it would a print request, uses PostScript to create a 200-dpi bitmap, applies Group 3 encoding, and sends the document. A bundled utility handles incoming faxes, allowing you to preview and print them.

PAUL FRANZ MOORE

Pizza, Anyone? Both the Nextstation and the Nextstation Color CPUs reside in low-profile boxes that hold 68040 chips, 2.88MB floppy drives, and built-in networking.

Foreign Exchange

Operating system changes include support for loadable device drivers and foreign file systems. The former means that manufacturers of exotic peripherals will be able to supply the appropriate device drivers, which you can install without having to rebuild the Mach kernel. The latter means that non-UNIX file systems can be mounted and accessed. MS-DOS support is already built in; if you insert an MS-DOS disk into the Next floppy drive, it mounts just as a regular Next floppy disk would, and you can freely transfer and modify files. Next is considering Macintosh compatibility, but has not yet implemented it.

Until now, Next has not actively pursued European customers (and vice versa), because of lack of support for non-English character sets. However, multilingual support is now built into the Workspace Manager, with each user able to select default and preferred character sets for his or her environments. Next has also released European language keyboards and has signaled an interest in the European market by rolling out its product in England, a week after the U.S. introduction.

Numerous changes have been made to Workspace Manager, the user interface analogous to the Finder on the Macintosh. The most visible changes in prerelease versions have been to the file browsers, which have increased in functionality, though at the expense of appearance and simplicity of use. It may well be that things change more before the final version is released. Workspace Manager now uses multithreading, so that, for example, you can still browse some files while copying others from one location to another. And the printing architecture has been rewritten to avoid the performance hits you take when printing a document.

Two new applications bundled with the Next are ShowAndTell and Installer. ShowAndTell records and plays back user events such as mouse movements, button clicks, and key strokes. These events can even be synchronized to a sound track, enabling you to create computer-driven presentations. Installer handles installation, compression, and deletion of files. Software distributors can use Installer's tools to compress their application files to fit on one or more floppy disks. End users can then copy, decompress, and install those files with Installer.

Further Developments

The development environment on the Next, arguably the best on any microcomputer, has gotten better. Next has improved and extended Interface Builder to allow creation of custom palettes; indeed, any NextStep application can now dynamically load objects. Several new tools, including AppInspector, MallocDebugger, and ProcessMonitor, allow you to inspect data structures, memory usage, and operating-system status of currently executing NextStep applications. And Next is selling (for the cost of media and handling) the full source code for its GNU-derived utilities (including its Objective C compiler), the Mach kernel, and the NetInfo utilities.

Some things have been dropped in Release 2.0. Mathematica is no longer bundled, except with systems shipped to educational institutions (Release 1.0 owners will get a free upgrade to Mathematica 2.0). Franz Common Lisp is no longer bundled, but is offered by Franz as a separate product. And the bundled Sybase server has also been dropped, although a special "database object" is included in Release 2.0 to facilitate development of database applications.

Next is actually distributing two versions of Release 2.0. The standard release, delivered on all systems that come with a 105MB hard drive, lacks the developer tools, demo programs, and much of the online documentation; it does include the online *Webster's Ninth New Collegiate Dictionary*, but without keywords and

indexed only for words that are defined. The extended release, delivered on all systems that come with a 340MB hard drive, includes all development tools, all demo programs, all online documentation (including technical manuals, the *Oxford Dictionary of Quotations*, the complete works of Shakespeare, and the full version of Webster's). This release is also available as an upgrade to the standard release.

What's Next?

An acquaintance of mine recently advanced a theory that Next's whole approach over the past two years has been a very deliberate and successfully executed plan. Introduce the product. Drum up enthusiasm to attract developers and investors. Spend little on advertising. Let pioneering users and developers test out the system and make suggestions. Fine-tune the hardware and the manufacturing process. Hold company size and expenses down where possible. Support the development of key third-party products. Then, when all the pieces are in place, release a complete product line and market the hell out of it.

That may be giving more credit to Next than it deserves. But it does deserve credit for once again setting the standard for personal computers and workstations, a standard which will undoubtedly be as widely pursued as its first effort was. The important question is, Will Next sell enough systems to continue its innovation and maintain the technological lead, or will it merely clear a path for others to follow? Only time will tell. ■

See *Where to Buy* for contact information.

***Bruce F. Webster** is a* Macworld *contributing editor and vice president of R&D at San Diego–based Pages, Inc.*

To compare the features and prices of the Nextcube and the Mac IIfx, I began with basic systems that include the largest-capacity hard drives available sold with each machine. All prices are manufacturer list prices, except for memory, which presumes $75 for each 1MB SIMM. The IIfx's advantages include more free slots (before color), more gray shades, and slightly larger display area on both monitors. The Nextcube's advantages include faster speed, sound input, a DSP chip, more bundled software, alpha-channel support, higher graphics acceleration, and more free slots (after color).

MAC IIFX VERSUS NEXTCUBE

	Mac IIfx System	List Price	Nextcube System	List Price
Basic System	4MB RAM, 160MB hard drive	$10,969	8MB RAM, 340MB hard drive	$9000
CPU	40MHz 68030		25MHz 68040	
MMU	built-in to 68030		built-in to 68040	
FPU	40MHz 68882		built-in to 68040	
DSP	none		25MHz 56001	
I/O processors	1 SCSI DMA, 2 serial I/O processors		12 DMA I/O processors	
ROM	512K		NA	
RAM	16MB	$880	16MB	$400
Video	Macintosh Display Card 8•24	$899	1120 × 832 × 4 shades (built-in)	
Monitor	Apple Two-Page Monochrome Monitor (1152 × 870 × 16)	$2149	MegaPixel Display (1120 × 832 × 4)	$995
Keyboard	Apple Keyboard	$129	Next keyboard	
Sound input	none		8-bit, 8kHz sampling	
Sound-input ports	none		microphone jack, built-in microphone	
Sound output	Apple sound chip with built-in speaker		56001 DSP with built-in speaker	
Sound-output ports	stereo minijack		stereo minijack, dual line-outs	
Other ports	serial (2); SCSI; ADB (2)		serial (2), SCSI/2, printer, DSP, Ethernet	
Slots	6 (4 available)		4 (3 available)	
Floppy drive	1.44MB		2.88MB	
Networking	AppleTalk (built-in), EtherTalk	$699	Ethernet (built-in)	
System software	A/UX 2.0 (on floppies)	$995	Release 2.0 extended	
Bundled software	System 6.0.6, HyperCard, Edit, Shell, UNIX utilities		WriteNow, Webster's Ninth New Collegiate Dictionary, Librarian, Mail, Edit, Shell, UNIX utilities, Quotations, Shakespeare,demo applications, NextStep development tools	
Total Retail Price for Monochrome System		$16,720		$10,395
Color monitor	Radius 19" Display (1152 × 882)	$4295	Next MegaPixel Color (1120 × 832)	$2995
Color video board	Radius DirectColor/24	$3595	Nextdimension (32-bit color with alpha)	$3995
Graphics acceleration	Radius QuickColor	$595	Intel i860 RISC processor	
Video integration	RadiusTV	$2795	NTSC/S-Video/RGB input and output	
Color compression	color-compression board [Note: no slots available]	$995	C-Cube JPEG color compression chip [note: two slots available]	
Total Retail Price for 24-bit System		$28,995		$16,390

JOHN SCULLEY BRIEFS THE PRESS WITH HIS TWO CLOSEST FRIENDS AT APPLE.

Macworld takes a look back at those special moments

by Jerry Borrell

YEAR IN REVIEW

APPLE'S HYPERCARD GROUP SHIFTED TO CLARIS MAKING 2.0 ...

IT WAS THE BEST OF TIMES, IT WAS, WELL . . . QUITE A YEAR. LAYOFFS, NEW MACS, FIRES IN THE EXECUTIVE BOARDROOM, THE LOWEST STOCK PRICE IN YEARS, REORGANIZATIONS, CLARIS ALMOST WENT—THEN CAME BACK.

BUT AT YEAR END THE STOCK WAS GOING UP AND JOHN SCULLEY DEMONSTRATED HE IS STILL FIRMLY IN CONTROL.

Additional research Louise Fickel and Sandy Butler

BUT DID THEY HAVE TO CHECK BAGS? THE PORTABLE CAN'T BE ALL THAT BAD—TELEVISION SHOTS FROM SPACE INCLUDED THIS ONE OF SHUTTLE SCIENTISTS WORKING AWAY.

TOP TEN THINGS WE'LL MISS ABOUT JEAN-LOUIS GASSÉE

- Irreverence for authority
- Personality
- Enthusiasm for technology
- The ability to speak without a TelePrompTer
- Byzantine metaphors
- Warmth
- License plate
- Civility
- Speeches written by the Grateful Dead

Things We Won't Miss

- Hatred of the British
- Self-promotion
- The Portable
- The earring

BEST-KEPT SECRETS OF THE YEAR

- Apple agrees to upgrade its larger customers with LaserWriters when they complain too much about their ImageWriter LQ printers
- Jean-Louis Gassée's new company

WORST-KEPT SECRETS OF THE YEAR

- Apple's new-product plans for 1990

BUSINESS WEEK March 15, 1990

Missing in Action: Apple

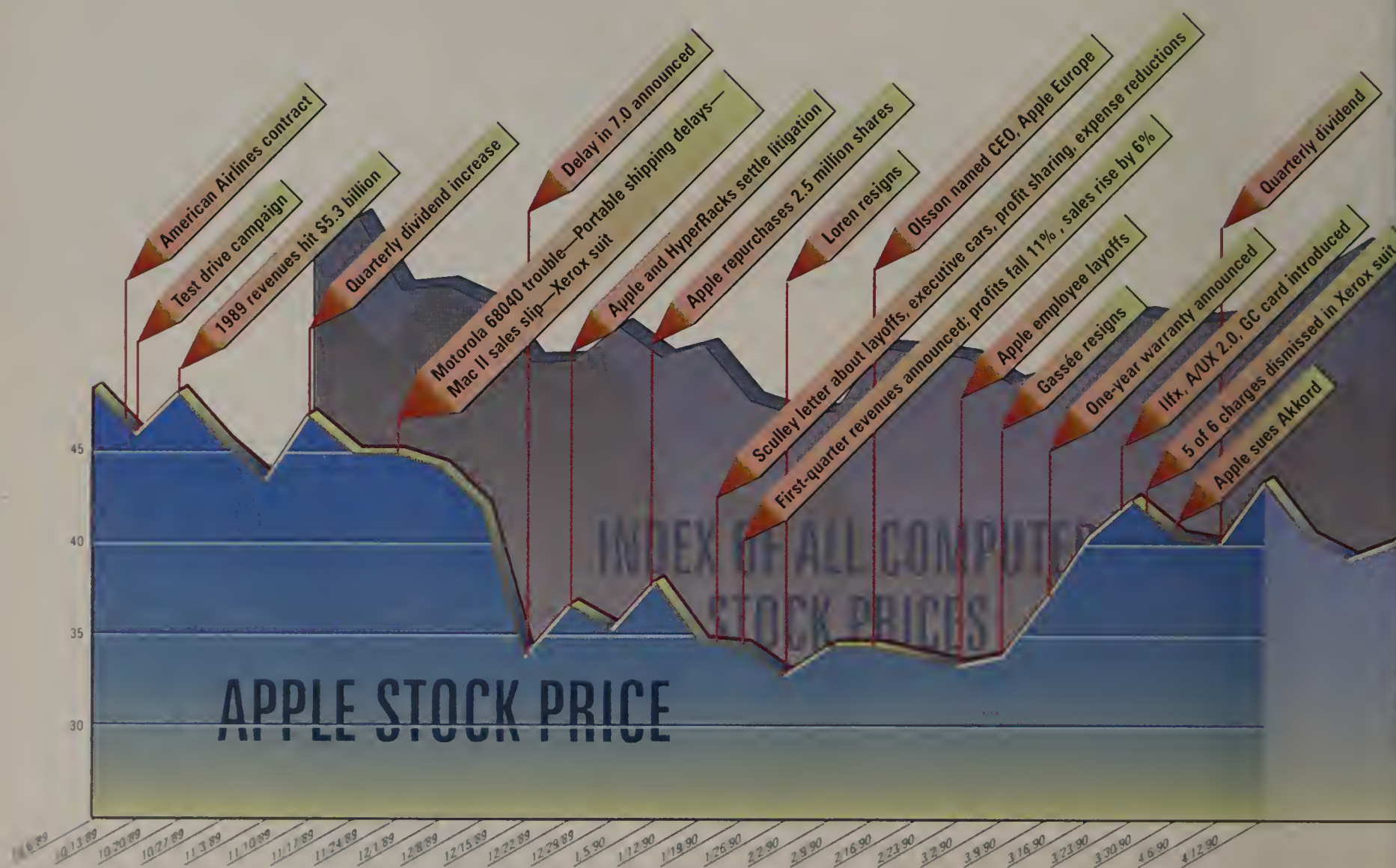
- Profit sharing
- Executive cars
- Apple Marketing
- Jean-Louis Gassée
- Evangelism
- Fax modem
- Apple II
- ImageWriter
- 8•24 GC card
- Cache card
- System 7.0
- Rain forests
- Claris
- Superbowl ads
- Knowledge Navigator

KNOWLEDGE NAVIGATOR

Missing in Action II (and aren't we glad?)

- Desktop anything
- The M word
- Helocars

BBD&O HELOCAR



Missing in Action: Developers

FULLWRITE, OBASE MAC, FOXGRAPH MAC, TRAPEZE, CRICKET ANYTHING, FILEVISION, MICROSOFT WRITE, ANY BORLAND PRODUCT FOR THE MAC, SMARTFORMS, PLUS

Best Hack of the Year: NetBunny

Released at the annual MacHack conference, NetBunny infests a network with drumming bunnies.

TOP USES FOR AN IMAGEWRITER

- Door jamb
- Counterbalance for person carrying a Portable
- Boat anchor
- Tax-deductible gift
- Let us know if you think of any

DEAL OF THE YEAR (we thought slavery was illegal)

- Apple acquires Outbound's technology

THEY'RE BACK

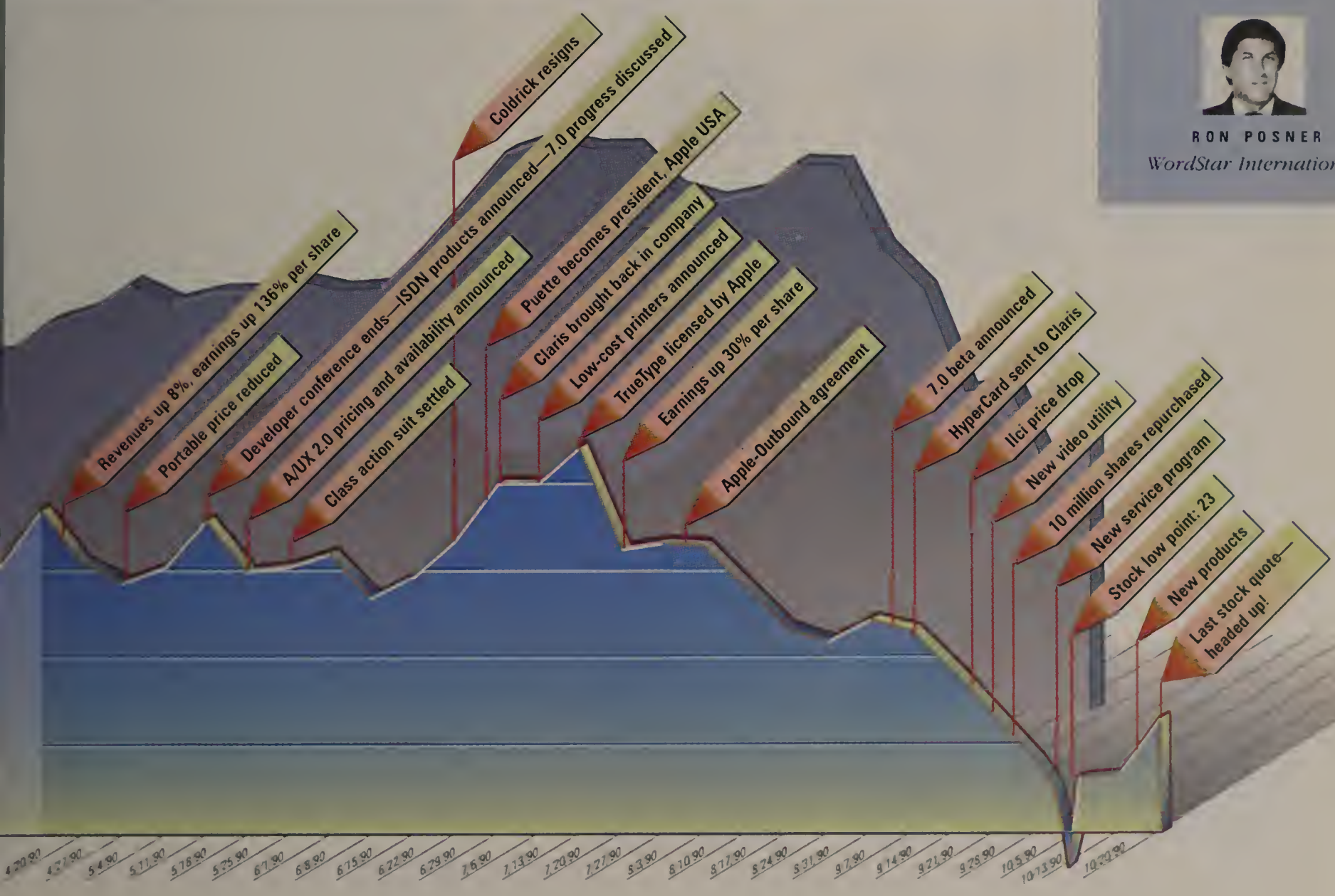
NATHAN SCHULOFF
VP, Jasmine

SAL PATALANO
President, New Era

TOM MASSIE
VP, Articulate Systems

GUY KAWASAKI
MacUser

RON POSNER
WordStar International



MAC MILLIONAIRES

CHARLIE JACKSON $19M

SUE & KEN CURRIER $14M

MIKE BOICH $8M

RICHARD SKEIE $6.5M

KIETH SORENSON $7M

JEAN-LOUIS GASSÉE $5M

BILL CAMPBELL $5M

JOHN ZEISLER $2M

YOGEN DALAL $2M

DASH CHANG $2M

EFRAIM ARAZI $1 TO $3M

JOE GRAZIANO $1.5M

Mac 100-Millionaire
BILL GATES

People Who Missed the List

JIM MANZI

FRED GIBBONS

ED ESBER

Apple Dictionairy

A survival guide for those who need to talk Applespeak

Apple advantage *(n)* 1: this year's euphemism for marketing bullshit 2: refer to **new-wave management** for historical context

attrition *(n)* 1: term used to describe layoffs 2: technique frequently used for redesigning organizational structure at Apple

bifurcation *(n)* a state of not knowing what one is doing

communications meeting *(n)* 1: reorganization (when applied to marketing activities) 2: new product exposition or product-planning strategy (when applied to product development)

flat organization *(n)* 1: result of a company's inability to retain midlevel managers 2: an effective means of destroying upper-level management

meet the bwana *(vernacular phrase)* 1: refer to **one on one**

new-wave management *(n)* 1: last year's euphemism for marketing bullshit

offsite *(n)* 1: *(archaic)* boondoggle 2: a meeting during which employees meet their peers or co-workers, often for the first time (contemporary)

one on one *(n)* 1: *(archaic)* song by Hall & Oates 2: any meaningful meeting taking place with only one other person—to be avoided at all costs

redeploy *(v)* 1: reorganize, with severe prejudice 2: lay off (alternate use)

replan *(v)* 1: redeploy (see earlier definition), with severe prejudice

sabbatical *(n)* 1: a vacation-like state to which employees retreat when reorganizations become too severe 2: a mandatory assignment given to managers who have fallen out of favor 3: prime factor for four-year employees to remain at Apple

special project 1: *(n)* kiss of death producing an effect on the designated recipient similar to that of a social disease (when affixed to a title) 2: see **task force**

take the package *(vernacular phrase)* 1: avoid the reorganization by resigning quietly, and we'll give you benefits

task force *(n)* 1: place to assign people being redeployed 2: *(v)* assign to oblivion <Let's ~ 'em> (alternate use) 3: *(n)* a tool used by managers to remove obstacles, specifically people

thank you for sharing your thoughts *(vernacular phrase)* 1: f**k you 2 favorite phrase of Jean-Louis

third-party developer 1. Apple R&D 2 Apple is first and second, others are third

CRO-MAGNON WOZ. STEVE WOZNIAK HAS CAVE BUILT INTO HIS CALIFORNIA HOME.

DEMONSTRATION IN NAGORNO-KARABAKH

STICK TO COMPUTERS. DEL YOCAM IN *FORTUNE* ANNOUNCING HIS PRODUCTION OF THE OFF-BROADWAY MUSICAL *ANNIE II*, WHICH DIED INSTANTLY

1990 Events and People

WEIRD SCIENCE—DON CASEY ANNOUNCES APPLE CUTTING-EDGE TECHNOLOGY FOR THE NEXT FIVE YEARS AND THEN LEAVES FOR LOTUS.

DEMONSTRATION IN CUPERTINO

APPLE BUSINESS MARKETING, FACING ITS SEVENTH REORG IN TWO YEARS, PASSED OUT MILK CARTONS WITH DEPARTING EMPLOYEES' NAMES

APPLE HIRES NEW JAPANESE SPOKESPERSON IN KEEPING WITH ITS SENSITIVE APPROACH TO LOCAL MARKETS.

"NO, YOU IDIOTS. I SAID CALL CLARIS AND TELL THEM I WANT THEM TO GO PUBLIC."

1989 TEST DRIVE

NAME THOSE EXECS. 1989 ANNUAL REPORT.

"SO, WHAT ARE YOU LOOKING AT?" "TRYING TO SEE IF I KNOW ANY OF OUR EXECUTIVES"

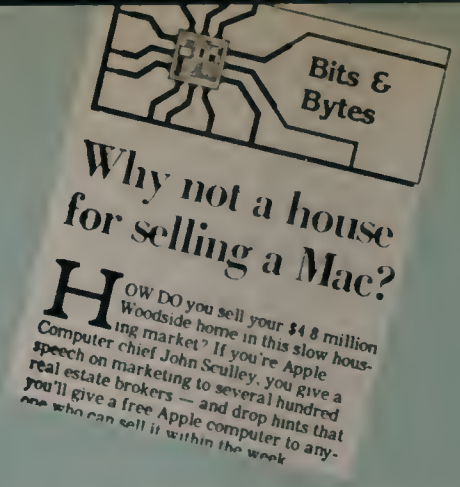
APPLE RETRIES ITS UNSUCCESSFUL "TEST-DRIVE A MAC" CAMPAIGN, UNSUCCESSFULLY FOR A SECOND TIME.

RENAISSANCE MAN. NOT ONLY A WORLD LEADER, BUT HEAD OF PRODUCT DEVELOPMENT AS WELL.

BEST NEW UNIT OF MEASURE: 1/X OF A GRAZ. AFTER GRAZIANO RECEIVED $1.5 MILLION TO RETURN TO APPLE, EMPLOYEES BEGAN TO REFER TO EXPENDITURES IN TERMS OF THE FRACTION.

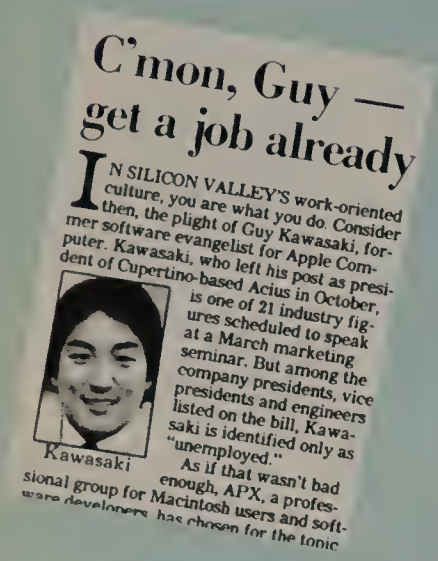
LINK 'EM DANNO—APPLE EMPLOYEES LANGUISH IN UP TO 100 APPLELINK E-MAIL MESSAGES PER DAY

Prophetic Headlines 1990

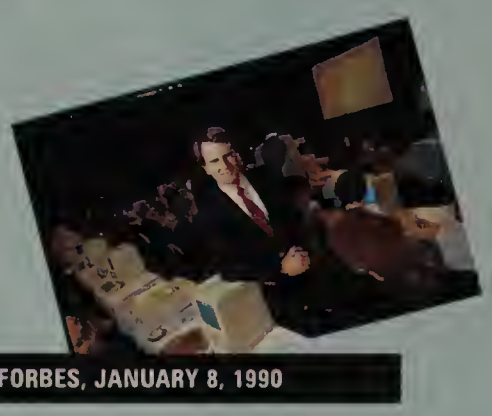


SOUNDS LIKE A DEAL TO US. ARTICLE IN THE *SAN JOSE MERCURY NEWS* MENTIONING JOHN SCULLEY'S OFFER OF A MAC TO THE REAL ESTATE AGENT WHO SELLS HIS OLD HOME.

WE NEVER THOUGHT WE'D SEE THE DAY. *ESQUIRE* WRITES AN EDITORIAL ON THE STATE OF MIND OF MAC VERSUS PC USERS.

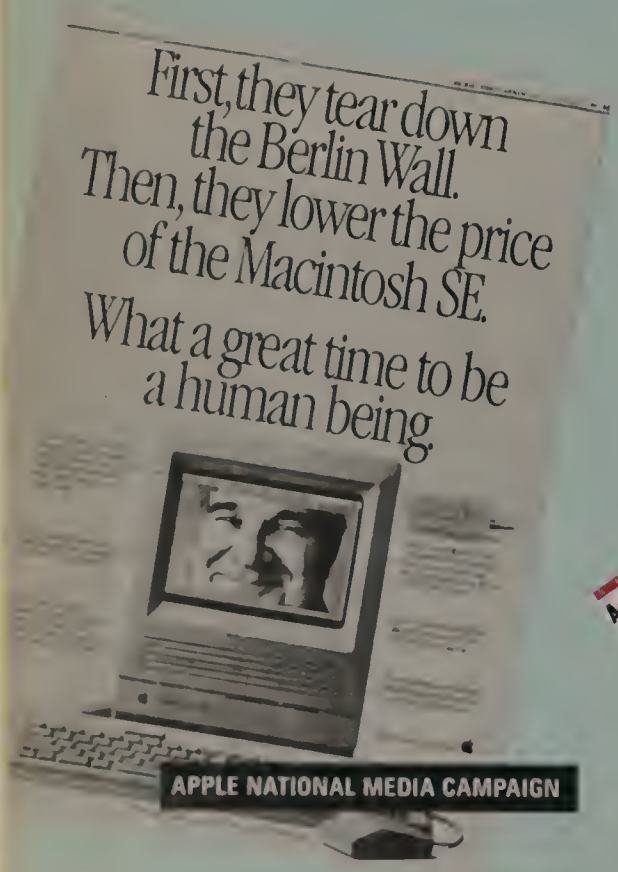


HEADLINE IN THE *SAN JOSE MERCURY NEWS* AFTER GUY KAWASAKI, FORMER APPLE EVANGELIST, LEAVES ACIUS AND BEGINS ENDORSING COMPUTER PRODUCTS



"WE'RE STILL A WORD OF MOUTH COMPANY"
THAT'S A LOT OF MOUTHS: APPLE SPENDS OVER $40 MILLION ON ADVERTISING ITS FIRST QUARTER.

PREDICTION: CONTINUED BAD WEATHER.



AN EVEN BETTER TIME TO WRITE AD COPY! SOMEHOW, THE BERLIN WALL DESERVES MORE

YES. BUT WILL ANYTHING BE DIFFERENT?

SEPARATED AT BIRTH?

Dash Chang and Bruce Lee

Allan Loren and Harpo Marx

Ian Diery and Gavin McLeod

Steve Bobker and Jabba the Hutt

Barbara Krause and The Dutch Boy

Phillip White and Rep. Dick Gephardt

Jean-Louis Gassee and Jack Nicholson

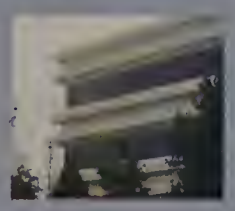
BEST NEW APPLE SLOGAN SUGGESTIONS

Changing the world, one person at a time.

Following the announcement of the discontinuation of profit sharing, Apple employees began to develop a list of alternative slogans for the company:

- The computer for the rich of us.
- The gurney is the reward.
- Apple. The journey is over.
- The few, the proud, the fewer.
- That was Zen, this is now.
- We make a profit, and we change the world too.
- Changing the world, one dividend check at a time.
- Quality is job one (or 90 days, whichever comes first).
- Because somebody has to make a profit.
- Apple. The money is the reward.
- It's not just a computer, it's 52 percent gross margin for us.
- Apple. Buy our computer or we'll sue you too.
- Apple. Changing the world one rich person at a time.
- Apple. Changing our minds about changing the world.

TOP SYSTEM 7.0 EXCUSES



- Earthquake.
- They're features, not bugs.
- What else would we talk about at developer conferences?
- My (fill in relative's name) died.
- The (fill in pet) ate my code.
- Apple reorg'd.
- 7.0, shit! We're already working on 8.0.
- Earthquake.
- Software . . . we don't have T-shirts yet!
- It's all Gassée's fault.
- We need another market survey.
- Someone lost the slides at the developer conference.
- We want it to be perfect.
- Ask Sculley, he's in charge now.
- We don't ship à la carte software.
- And have we told you about the earthquake?

FUN COUPLES

JOHN SCULL AND MARC CANTER

BILL GATES AND MICHAEL JACKSON

RAY NORDA AND JIM MANZI

1990 FAVORITE JARGON

- INIT Hell
- SCSI Wars
- Technoweenie
- Geek Chic
- ID=02 and ID=12 (System crash)

MOST ASKED QUESTIONS OF 1990

- What's my SCSI ID?
- Why can't I print this document?
- Where do I put my terminator?

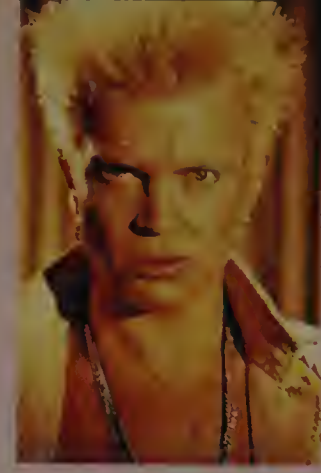
TOP NONSTANDARDS OF 1990

SCSI, PICT, color, sound, EPS, TIFF, video, modems, RS-232C

AND THERE'S ALWAYS 1991

Send your nominations for the 1991 year in review to the editor-in-chief. If your suggestion is printed I'll send you a *Macworld* T-shirt.

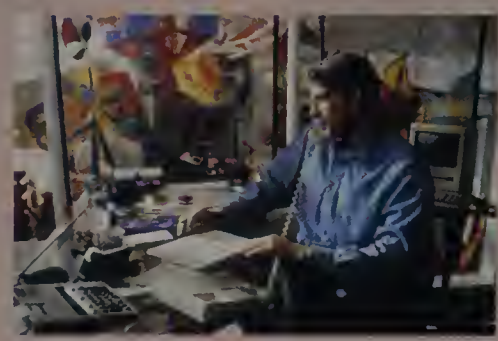
INTERGALACTIC DRUG WARS: *I COME IN PEACE.* (JUST SAY NO.) SPECIAL AWARD FOR MOST MAC SCENES IN A MOVIE (4).



SEXIEST USE OF A MAC ON MTV: BILLY IDOL'S "CRADLE OF LOVE" VIDEO SPECIAL COMMENDATION FROM THE ACADEMY.

MOST MOGWAIS IN A SCENE WITH A MAC: *GREMLINS 2*. SPECIAL AWARD FOR SCENE WITH GREMLINS SPEWING GUCK ON MAC.

MOST APPROPRIATE USE OF A MAC: *PACIFIC HEIGHTS,* WHICH FEATURES YUPPIE USING MAC. (SPECIAL DEMERIT—IT'S NEVER TURNED ON.)

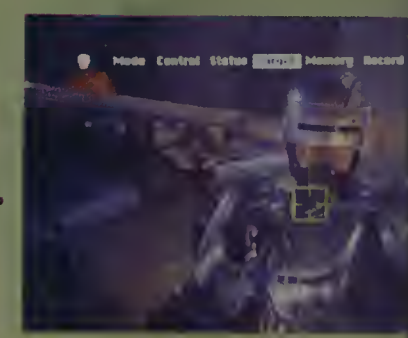


The Mac in Movies and TV

BEST USE OF A MAC IN A FILM WITH MEL GIBSON'S BUNS: *BIRD ON A WIRE.*

MOST MENACING MAC IN A FILM: *PROM NIGHT II.* AND YOU THOUGHT ELF WAS A PROBLEM.

BEST CORPORATE MAC: *MADHOUSE.* STAR SEEN ACTUALLY USING MAC IN A BUSINESS. ALSO BEST KIRSTIE ALLEY FILM WITH A MAC.



MOST CREATIVE USE OF RESEDIT: *ROBOCOP 2,* IN WHICH SKULL REPLACES APPLE ICON ON BAD ROBOT.

WORST REMAKE EVER, DESPITE THE MAC: "GOLDEN SERPENT," A "MISSION IMPOSSIBLE" COMEBACK. BY THE SAME GUY WHO WROTE *ANNIE II?*

MAFIOSO AND MAC: *THE FRESHMAN.* OK, THE FILM SUCKS. BUT A MAC IN A FILM WITH MARLON. CHECK IT OUT.

WORST LETDOWN OF THE SEASON WITH A MAC: "TWIN PEAKS."

Macworld Limited-Edition CD ROM

The Macworld Showcase CD ROM includes Macworld Interactive—a multimedia magazine created with Authorware Professional that interleaves two articles from our June 1990 issue with animation and sound, and uses a unique metaphor for browsing that gives the user completely interactive navigational control. In addition, you'll get all 28 award-winning SuperStacks, chosen for their excellence in stackware design; HyperCard 2.0 (plus all 6 previous releases and 15 foreign-language versions); and 8 interactive stackware and CD ROM catalogs.

KOJI SONODA

Most CD ROMs cost $100 or more. Now, for the cost of your favorite audio CD, you can explore the new world of CD ROM. All you need is $15 and a CD ROM player (or a friend with one). Don't be left out of the biggest revolution in electronic publishing since the floppy disk.

$15

Gets You over 200MB of Interactive Multimedia Applications

Send for your Macworld CD ROM today!

NAME

COMPANY

ADDRESS

CITY STATE ZIP

PHONE

I currently own a Mac Plus SE SE/30 II IIx IIci IIcx IIfx

I own a CD Rom drive Yes No

Please send me copies of the Macworld Showcase CD. $15/copy* (includes shipping cost) (Residents of CA, TX, GA, NJ, IL, and MA add applicable sales tax.) Total $

VISA MasterCard American Express

CARD NUMBER EXPIRATION DATE

SIGNATURE

Send your completed form to: IDG - Macworld CD ROM
P.O. Box 139, Peterborough, NH 03468; or call 1-800/343-0728, 603/924-9471, or FAX: 603/924-9384

Make checks or money orders payable to IDG. *All orders payable in U.S. dollars. Canadian Orders $17 Overseas Orders $20

REVIEWS

Photo-Realism Software

MACRENDERMAN 3.1

Pros: Extensible; allows full access to advanced features. **Cons:** Shadow casting is cumbersome; INIT conflicts; advanced features require programming; few shaders available; not WYSIWYG. **Company:** Pixar. **Requires:** Mac II, 5MB of RAM; hard drive with 5MB free disk space; 8-bit color display system. 8MB of RAM and 24-bit color display system recommended. Requires System 6.0.3; MultiFinder; 32-bit QuickDraw; MacRenderMan-compatible modeler. **List price:** $795.

CENTER OF ELECTRONIC ART

Click. After spending hours arranging flowers, furniture, and lights, you press the shutter. Click. The strobes flash. Photons flood the room. They are absorbed, reflected, refracted, form shadows, penumbras, and umbras. During the shutter's wink, trillions of interactions occur, and almost countless photons head to the camera to be gathered and focused by the lens. They strike the film emulsion, and a photo is born. Simply put, RenderMan's job is to simulate everything that occurs after that simple click.

Using scientific principals, algorithms, and computer graphics technology, RenderMan simulates how objects and their geometry, surface properties, and motions interact in an environment with complex lighting and atmospheric conditions, and how all of this is seen by a camera. The results, dubbed digital photo-realism, are difficult to distinguish from ordinary snapshots.

Split Personality?

MacRenderMan is composed of two parts: the RenderApp software and the RenderMan Shading Language. Using the MacRenderMan software is not much harder than clicking a camera shutter. The real work is done with a third-party modeling program such as Swivel 3D or StrataVision 3d. In the modeler, you describe a scene by creating objects (geometry and surface appearance), positioning them (rearranging the furniture), arranging the lighting and atmospherics, and setting up the viewer (synthetic camera).

The modeler then automatically creates a RenderMan Interface Bytestream file. RIB files are scene-description documents, analogous to EPS files; a RIB file is to a 3-D scene what a PostScript file is to the printed page. The RIB file links the modeler to MacRenderMan's RenderApp program, which turns the file into a picture, more or less automatically. This rendering process, once initiated, happens in the background (under MultiFinder) using RenderMonitor (just like PrintMonitor.)

The surface appearance of each object in a scene, as well as the properties of all lights and atmospheric effects such as fog, is represented in the RIB file by invocations of shaders. Shaders are written in the RenderMan Shading Language, which closely resembles the C language. RenderApp (the rendering part of RenderMan) comes with nine shaders, all of which are supported by products like Swivel 3D or StrataVision 3d. Obviously, this number will increase. Pixar is also planning to sell custom shaders, or you can write your own. Writing custom shaders, however, is not likely to be practiced by anyone other than programmers familiar with 3-D shading algorithms, and at that, will require further study of the shading language. It is the responsibility of the third-party modeling program to take full

advantage of the available shaders. Basically, you select an object or surface in your model, select a shader, and then modify the shader's parameters. If the modeler doesn't allow you to change the parameters, and you're brave, you can use a text editor on the RIB file and make the changes yourself.

If you're not that brave, StrataVision 3d provides a good alternative. Although it can't yet provide the advanced looks of RenderMan's motion blur or displacement, for less advanced rendering needs, it might be all you need.

To compensate for digital photorealism's main drawback—slowness—Pixar includes a number of options. In RenderApp, instead of immediately rendering a RIB file you can select various options from the Render Setup dialog box including saving the file as a screen window or as a PICT, TIFF, or color or black-and-white PostScript file. You can also trade image quality for render speed by choosing a lower resolution and a higher shading rate. The shading rate defines the size of the rectangle used in the shading calculations. If the shading rate is 2, then a shading calculation is done once for a 2 by 2 pixel area. If the shading rate is 0.5, there will be four shading calculations done for every pixel. You can also vary the sampling rate. Sampling rate defines the number of samples per pixel that are taken to contribute to the final pixel value. If the sampling rate is 1 by 1, then only a single sample per pixel is taken, and if the sampling rate is 3 by 3, then 9 samples are taken to produce the final pixel value. Again the trade-off is quality for speed. For advanced features, such as motion blur, a larger sampling area is required (at least 4 pixels by 4 pixels). All these options are invaluable while tweaking subtle things such as light, color, intensity, placement, or objects' surface properties.

The Crop box lets you render a portion of a scene. For example, you can crop out everything but one highlight of one object in a scene. Also, MacRenderMan lets you choose (via the Chooser) between VectRMan, a wire-frame renderer (which is fast and shows edges only) or a photo-realistic renderer, PhotoRMan.

CPU-and-Memory Hog

Although MacRenderMan is designed to run in the background, it demands so much processing power and memory that background operation is not workable. It's hard to imagine an application that could be more of a CPU hog. For example, I couldn't run RenderApp and Swivel 3D simultaneously on a Mac II with 8MB of RAM.

The usefulness of background computing diminishes severely if you're using anything less powerful than a Macintosh IIfx. Even with a IIfx, other graphics applications can be unresponsive.

Polygons and Texture Maps

Describing a surface with polygons is like describing a line with pixels: the closer you get, the worse it looks. Using a higher-order mathematical description for a surface has several advantages. First, just as with a PostScript edge, the cleanness of a surface is limited only by output-device resolution. Second, mathematical descriptions are much more compact. Third, they are more easily modified. All the current Mac modelers create only polygonal objects. MacRenderMan works much better with the more elegant mathematical surfaces.

Pixar has included a new kind of texture-mapping procedure that's not available in any other Mac rendering package: 3-D, or *procedural* textures. A 3-D texture is defined not by PICT or TIFF, but by a program that generates texture even inside an object. For example, if you tell MacRenderMan to shade an object with a wood grain, you can animate the wood as it's carved. Each frame showing newly revealed wood grain is realistically related in appearance to the previous and next frames. In the MacRenderMan world, all mapping techniques are implemented using shaders.

Pixar has extended the concept of texture mapping into 3-D another way. Displacement shaders elaborate on the geometry of the object. For example, a simple torus can be made to look like the tire of a mountain bike, even in profile. Or an iron plate can rust completely through. All of this detail is procedural, like the wood example, and thus adds almost nothing to the size of the RIB file.

Motion Blur

Everyone's familiar with photographs of moving headlights at night: they turn out as streams of bright light. In other words, while the camera shutter is open, the world moves, and the movement is recorded on the film. This feature, which is invaluable in animation of quickly moving objects and adds dynamism even to stills, is not available in MacRenderMan.

It's clear that MacRenderMan is powerful. However, it makes no attempt to provide a user interface to its advanced features. Sure, the standard Mac features are there, like file opening, and so on, but there's no real graphic user interface to MacRenderMan's powers. MacRenderMan's architecture requires vendors to create their own graphic user interface for each aspect of RenderMan they want to support.

Another problem with the separation-of-powers approach is evident when you use a modeler to preview what will eventually be rendered with MacRenderMan. In general, when working with the modeler, you use pictures rendered (relatively quickly) by the modeler to make decisions. The modeler's pictures aren't supposed to look as good as MacRenderMan's; you get speed, not quality. This forces you into a non-WYSIWYG environment. The only solution is for each modeler to do as good a job as possible on its own rendering. And as modelers improve, the need for MacRenderMan lessens! StrataVision 3d takes this approach; it comes with RenderMan-compatible shaders that mimic all of Stratavision's varieties of rendering. Rendering a Stratavision scene in Stratavision can take as long as or longer than it does in MacRenderMan; MacRenderMan is needed only for the most esoteric shaders, such as displacement mapping (geometry-altering shaders) or motion blur.

For the technically astute, photorealism is available now. For the rest of us, I suspect it will be a little longer before modelers have the geometry to equal the quality of MacRenderMan's rendering, and before the interface between modeler and renderer allows us to be real users.—**Harold Hedelman**

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Macro Program

QUICKEYS² 2.0

Pros: Extremely useful; multistep macros far simpler to create; choice of real-time or step-time macro playback. **Cons:** Still not completely intuitive; can't combine step-time and real-time methods; some minor bugs and incompatibilities. **Company:** CE Software. **Requires:** Mac Plus. **List price:** $149.95.

A Mac owner has one of the world's greatest productivity enhancers sitting on the desk—a computer that can perform repetitious and tedious tasks without complaint. Yet many of us don't take full advantage of that capability. Every time we type a return address, back up a hard drive, or even click on a window's close box, we're doing work that the Mac could be doing for us.

That's what a macro program like the new QuicKeys² is good for—behaving like a super-smart mimic. By watching you perform a task, the program can then precisely repeat your actions, at any time, on cue (at the press of a key or key combination). QuicKeys has always been the premier macro program, and with QuicKeys², CE Software has wiped out nearly every one of the original program's weak spots. The result is a partner in computing that's trustworthy, intelligent, nicely designed—but buggy.

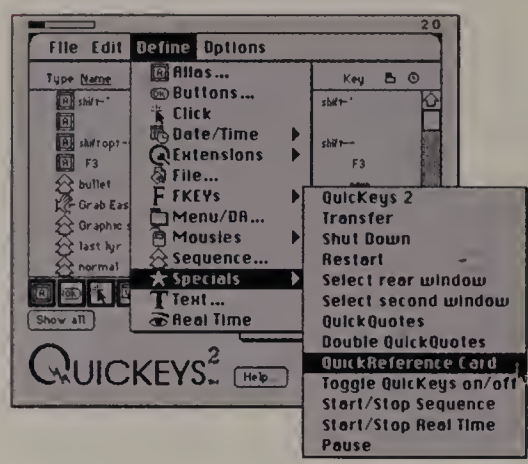
Quick Thinking

QuicKeys' home base is the Control Panel. This is where you program, or teach QuicKeys what to do. Like the old QuicKeys, the upgrade classifies all Macintosh tasks into about a dozen types. In brief, you train QuicKeys to do one of the following when you press a key: type something; click on a button; click and/or drag; type the date (in a format you select); launch a program or a file; invoke an F-key (function key); open a desk accessory; select a menu item; select, close, scroll, or zoom a window; or restart (or shut down) the computer (see "QK Okay"). Some combinations of these elements can reproduce virtually anything you can do on the Macintosh.

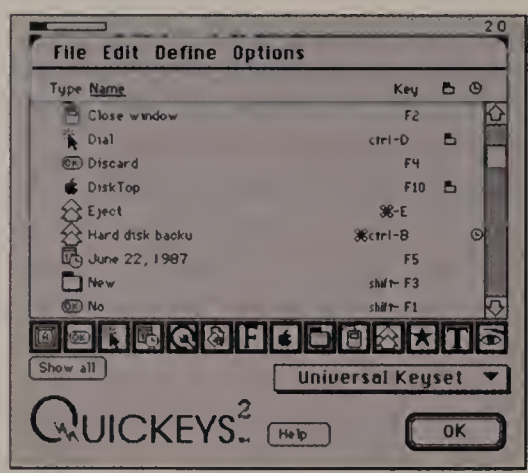
That said, you can see the value of QuicKeys²'s most dramatic improvements—its powerful, simple implementation of multistep macros, which combine a series of individual actions. There are now two different types of such combinations: step-time, *Sequences*, and real-time, *Recordings*.

Step by Step

To create a step-time macro, you teach QuicKeys by doing: go ahead and open a file, copy your logo from the Scrapbook, set the font to 12-point Palatino,



QK Okay There are two ways to create macros in QuicKeys²: by using a watch-me mode or by building each macro individually, as seen in this example. You choose the type of macro you want from the Define menu. In the Specials submenu, you'll see a number of useful canned macros—such as QuickQuotes, which automatically creates curly quotes (like these: " ") whenever you type a double quotation mark, or QuickReference Card, which displays a list of all your macros at the touch of a key.



Now Showing The new QuicKeys interface has a row of icons across the bottom, each representing one type of QuicKeys macro. Click on an icon to view only the macros of that type (for example, only the sequences). In the right-hand columns, a tiny menu icon means that the designated macro will be listed at the top of the Apple menu; a tiny clock icon means that the macro is programmed to go off at a specified time.

and push the margins out to 1 inch. QuicKeys stores each step in its Sequence editor, which appears when you've finished the task.

In the original program, every step of a macro had to first be a stand-alone QuicKey complete with keyboard assignment before you could string several together into a Sequence. But because you'd never want to invoke one of these single-step macros except as part of a Sequence, you'd try to assign each to a keystroke you *couldn't* remember (and would never hit accidentally). In Macintosh user groups, you'd hear people chuckling about the crazy keystrokes they'd invent—⌘-Shift-Control-Option-F13—to get around that inconvenience.

In the new QuicKeys, the individual steps don't require trigger keystrokes of their own. Furthermore, they don't clutter up the main QuicKeys screen; they appear only in the Sequence editor, where you can edit and rearrange them, delete any false steps you took while recording, and so on.

The advantage of a Sequence is that, when you play it back, it rips through the steps at blinding speed. If you've never used a macro program before, you're in for a treat: the cursor flies at superhuman speeds, menus flash down and up again before you can even read them, and dialog boxes blink away as QuicKeys clicks on buttons before they even fully appear on the screen.

Getting Real

The other major improvement to QuicKeys is its newest type of macro: a real-time Recording. Once again, you teach QuicKeys by doing the task yourself while QuicKeys "watches." But where the Sequence recorder notes only the actual accomplishments—the menu commands you ultimately selected, the buttons you clicked on, and so forth—the real-time recorder stores every little false step, mouse-meandering, and hesitation.

With real-time Recording you can't edit the result at all, as you can in the Sequence editor. QuicKeys plays the whole thing back—with precisely the same speed and dexterity you had when you recorded it.

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Getting Better

QuicKeys²'s design is also a welcome improvement. At last, the entire QuicKeys system has been incorporated into a single program—the macro-copying and -pasting utility (Quick Access) and the timer INIT are no longer separate programs (see "Now Showing"). QuicKeys has always had an on-screen quick-reference display, listing all macros and their key assignments; but in QuicKeys², this reference screen is "hot"—click on any macro name to play it. You also get a handful of Extensions, macros created by other companies that QuicKeys can play. For example, an Extension might play a sound, unstuff a StuffIt Deluxe archive, or mount an AppleShare volume. There are dozens of other enhancements, all displaying a lot of creative, detail-attentive thought.

Bug Repellent

QuicKeys could still improve in ease-of-use, however. For example, the only clue to a macro's function is its name, which can't be more than 15 letters long; QuicKeys aches for a Description feature like that in Apple's simpler—but free—MacroMaker.

But QuicKeys²'s biggest problem is its bugs—a surprising deviation from CE Software's fine track record. There are strange beeps at start-up, button-clicking QuicKeys don't work in Excel, the QuicKeys menu doesn't appear in some programs, and so on. Other bugs are more irritating: existing QuicKeys 1.2 macros don't load properly, macro sets fail to switch when you move from one program to another, and the whole QuicKeys system—menu command, Control Panel tile, and all—vanishes while you're working. Users have reported minor or major incompatibilities with FullWrite, Suitcase, MasterJuggler, Smart Alarms, Coach Professional, and others. For a company that touts Quality Assurance in its About box, CE Software seems to have released QuicKeys² a tad prematurely.

If QuicKeys² were bug-free, it would begin paying for itself in time savings from the very first macro. The smooth, mystical-looking real-time Recording macro is an incredible tool for training and presentation-making. It feels great slapping the Esc key to close the current window instead of fumbling for the mouse. And, of course, you'll never have to type your return address again. CE Software says it's working to exterminate the program's glitches, and that a new version will be available by the time you read this. When that day comes, get out your checkbook.—**David Pogue**

See **Where to Buy** *or circle 757 on reader service card.*

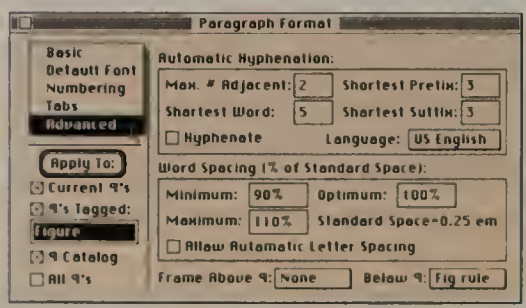
Long-Document Publishing Program

FRAMEMAKER 2.1

Pros: Extensive long-document tools; character and paragraph styles; anchored frames with flexible positioning; robust equation handling. **Cons:** No manual kerning; problematic import of Word styles; no styles based on other styles; limited color output options; no table editor; double-clicking on file doesn't launch program. **Company:** Frame Technology Corporation. **Requires:** Mac SE; 2MB of RAM; hard drive. 4MB of RAM and full-page monitor recommended. **List price:** $995.

At first glance, the Macintosh version of FrameMaker 2.1 (the publishing favorite on UNIX-based Sun and Next machines) looks like just another page-layout program, albeit with more-than-impressive features for creating long, structured documents. With cross-referencing, footnotes, indexing, autonumbering, and anchored frames, FrameMaker looks like the long-document and technical production tool that Mac users have awaited so long.

FrameMaker is not a page-layout program in the sense that Macintosh users understand the term. First and foremost, FrameMaker doesn't import formatted text files (it does import the text and it imports graphics files in all the major graphics formats). You can *open* formatted Microsoft Word and MacWrite files from within FrameMaker, and the program converts them into FrameMaker documents; from there you can cut and paste formatted text into another FrameMaker document. But you can't just import the formatted text.



Apply Within There are five dialog boxes controlling paragraph formats in FrameMaker, all accessed via the Paragraph Format option. You can apply changes to selected paragraphs, tagged paragraphs, the style itself (the ¶ catalog), and all paragraphs in the document.

This problem is compounded by a bug in FrameMaker's handling of Word's paragraph styles. When you open a styled Word document in FrameMaker, the first style tag, "heading1" for instance, appears as "heading1A"; the second, as "heading1B"; and so on, up to and beyond "heading1ZZ." This makes it incredibly unwieldy to work with. Frame says that a fix is coming but not in the first maintenance release, which is due by the time you read this. However, that release will fix another, more embarrassing, bug: double-clicking on a file in the Finder doesn't launch FrameMaker; you have to start the program and then open the file.

An Authoring Tool

FrameMaker is designed as an authoring or document processing tool. Ideally writers work in the program from the beginning. They write documents; build all their cross-references, captions, call-outs, and index entries; check spelling; search and replace; and so on—without ever resorting to importing or exporting or dealing with the anomalies that inevitably result. Last-minute changes are simplified because everyone—in writing, editorial, and production—works on a single, live document. This means that FrameMaker works best on a server-based network, where everyone can get at the master files. You can even use it on a mixed network that includes Sun and Next workstations.

The trade-off, of course, is that for FrameMaker to work seamlessly, everyone working on the job needs a copy of the program (at $995 a pop) and must learn to use it. Bringing new writers up to speed in such a big program takes quite a bit of training, and

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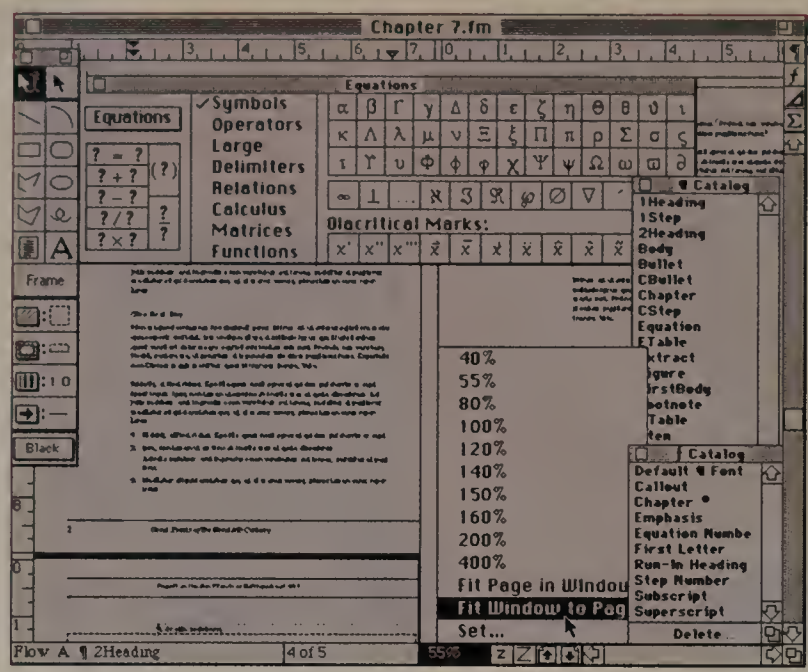

Palettive FrameMaker's four palettes give you access to tools for drawing and equation building, and to the catalogs of character and paragraph styles. The info bar at the bottom of the window shows the name of the flow, the style tag of the currently selected paragraph, the page number, and the level of magnification.

with projects that involve outside writers, the cost of the program and the training can be prohibitive in both time and money.

Document Toolbox

Given the difference between FrameMaker and other Mac page-makeup programs, it's easy to rave about the program's features: a laundry list of abilities long awaited by Mac long-document publishers.

FrameMaker has an adequate set of drawing tools (including bezier curves) and robust word processing: automatic cross-referencing, indexing, numbering; footnotes, figure lists, and tables of contents; equation generation (and analysis); definable variables; anchored frames; and even hypertext capabilities (the impressive—though not context-sensitive—hypertext help system is simply a FrameMaker document itself).

You can create any number of variables for text. For example, if you're writing documentation for a product that is as yet unnamed or has a code name, you can insert a variable called "product name" and assign it a value of "CodeName." When you finalize the product name, you just change the value for the variable and FrameMaker updates it throughout the document. You can even insert formatting instructions as part of a value.

The cross-reference feature is equally strong. You can refer to heads, figures, page numbers, and section numbers individually or in any combination. FrameMaker even lets you jump to the cross-reference location, and alerts you if it can't find the source of a cross-reference.

The indexing function is powerful, though not nearly as easy to use as PageMaker's. There's no list of all the existing index topics from which to choose; you must enter the topic correctly each time or let the program simply index every word.

Go with the Flow

FrameMaker works with *flows* of text—continuous stories that jump from column to column and page to page. You can name the different flows in a document and assign properties to each. For instance, you can set up baseline synchronization so baselines of type align from column to column.

FrameMaker's vertical justification is only slightly more sophisticated than QuarkXPress's. You can specify the maximum interline and interparagraph spacing, but not for individual paragraphs or paragraph styles—only for a complete flow.

Power Styles

FrameMaker offers character styles in addition to the more familiar paragraph styles, which makes it much easier to format run-in heads and other consistently formatted characters that don't make up whole paragraphs. You can apply formatting changes in several ways but you can't base one style on another (see "Apply Within"). If you decide to change the typeface for body copy, for example, you have to go through and edit all the body styles—bullet lists, numbered lists, and so on—rather than just editing the style for body copy and having the change automatically ripple through all the styles based on that style.

Within a style, you can define formatting using all of FrameMaker's impressive specification tools—indents, tabs, spacing, leading, alignment, hyphenation and justification, typeface, size, spread (the amount of spacing between letters), and automatic numbering (you get to choose from several numbering schemes).

Moving Pictures

At long last, you can specify that a frame previously created on the Reference Page be automatically inserted above or below any paragraph (or style of paragraph). The frames can contain just about anything—from a simple line to a complex text-and-graphics conglomeration.

You can also attach *anchored frames* to text at any location. These frames remain in a specified position relative to the location of their anchor point, for example, floating at the top or bottom of the column containing their anchor; within the line containing the anchor, or right after that line; even adjacent to the paragraph—outside the column on the left or right, or on what will be the inside or outside of a bound page.

There is one failing with FrameMaker's anchored frames, however: floating illustrations in a multicolumn layout are limited to the width of a single column; otherwise they overprint on adjacent columns. Illustrations wider than a column must be placed manually and moved as the document repaginates.

Not for Designers

With all this long-document automation power, you can hardly expect FrameMaker to shine for short, design-intensive documents. And it doesn't. There's no manual kerning (there is automatic pair kerning), much less automatic tracking. EPS graphics appear in opaque white bounding boxes, making them hard to position on top of other elements, though the boxes are transparent when printed.

You can use up to eight predefined spot colors in a document, and while there are good controls for

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Circle 258 on reader service card

specifying which of those colors display and print, options for printing high-quality film output are quite limited. These factors and others make FrameMaker a poor choice for short-document designers. And book publishers and others with stringent typographic requirements should think twice before deciding on FrameMaker.

One other thing is missing from FrameMaker, but then it's missing from the whole Mac environment—a powerful table editor. There's a whole minimanual showing how to produce tables in FrameMaker, but the method is nowhere near as intuitive and workable as, for instance, Ventura Publisher's table editor (for PCs, but coming soon to the Mac).

Documentation and Support

Frame's tech support is accessible (I talked to a person on my very first call—no waiting, no call back), and the technicians seem well informed. That's good, because this is a big, complex program that many potential users (such as writers and editors) may find daunting. FrameMaker's manuals—all ten of them, each well indexed—do an acceptable job of showing you how to use the program's features, but fall a bit short on conceptual explanations. There is no overview, for instance, of what a Marker is—just a terse definition and several specific usage examples.

You should plan on using a 68020 or faster machine to run FrameMaker; it's pretty sluggish on SEs, especially when working with large documents. For the sake of speed, the program holds all the text in open documents in memory, and simply will not open or handle chapters that exceed available memory. You should also have a minimum of 3 or 4 megabytes under MultiFinder in order to work with documents totaling around 150 pages.

Given the concept behind its design—that everyone from writers to production workers use FrameMaker and work on a common live file—this program is magnificent. It's very solid, makes excellent use of the Mac interface (these folks got religion), and brings to the Mac features that we've never seen before, and some we've never even dreamed of.—**Steve Roth**

See Where to Buy or circle 736 on reader service card.

Black-and-White Paint Program

AMAZING PAINT 1.0

Pros: Quick; intuitive; uncluttered, functional interface; multiple-level Undo.
Cons: Lacks some features found in other black-and-white paint programs; maximum painting size 8 by 10 inches; poorly indexed, sparse manual.
Company: CE Software. **Requires:** Mac 512KE. **List price:** $99.95.

What on earth was CE Software thinking? With Mac-, Super-, Full-, Ultra-, Desk-, Master-, Nu-, and other -Paint programs already on the market, why would the company introduce yet another—with no color, fewer features, and the smallest document size of any program?

Apparently CE Software was thinking: Interface. Amazing Paint seeks to remake MacPaint for the nineties, without complicating its interface one iota. Next to feature-swamped programs like UltraPaint, Amazing Paint looks positively barren. But every aspect of Amazing Paint is slightly more user friendly, more natural—from the multiple-level Undo right down to the space between words in the program's title.

Amazing Interface

There's nothing so inviting as Amazing Paint's opening display (see "Clean as a Whistle"). The usual tool palette is neatly tucked aside, and it contains only the classic, familiar painting tools.

Within this apparently unremarkable tool palette, however, is Amazing Paint's most impressive interface improvement: the Action Panel. To the right of the tool set but within the same floating window, there's a wide strip whose contents change depending on the tool you've selected. For example, when you're using the paintbrush, the Action Panel contains pop-up palettes for brush shape and pattern. When you click on the line tool, you're offered pop-up palettes for line thickness, pattern, and arrowhead style. Click on the eraser, and there's only one pop-up—for choosing eraser size. Click on the spray can and three icons pop up, one for setting the size of the nozzle, one for the pattern to be sprayed, and one for the rate of spray.

This isn't simply a rearrangement of the traditional paint-program interface elements, either. By displaying controls only when they're relevant—that is, when the appropriate tool is selected—there's much less clutter, less distraction, less wondering where to find things. There's not much point in a pattern-selection palette, for example, when you're drawing with the pencil, so why display it?

But the greatest advantage conferred by this setup is that it leaves plenty of room on the Action Panel for something you've never seen before in a tool icon–based program: labels. Each of these pop-up selection palettes has been neatly titled: Fill Pattern, Line Width, Eraser Shape, and so on. The confusion introduced by most other paint programs—which condemn you to repeatedly select patterns from two identical-looking pattern palettes, trying to figure out which is the fill and

(continues)

Clean as a Whistle When you select a tool icon, the right half of the tool palette displays pop-up icon palettes that pertain only to the active tool.

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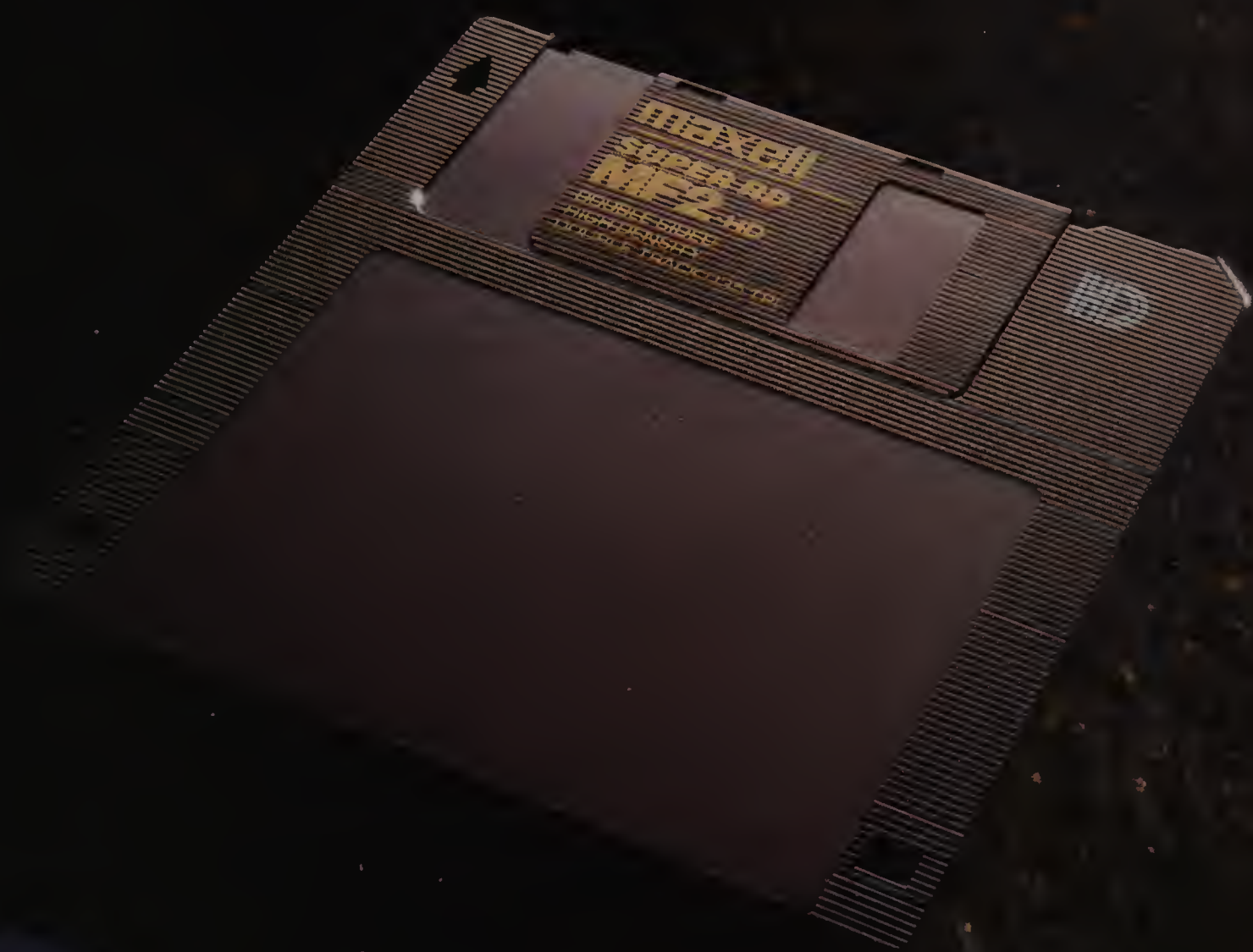

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which is the "frame" pattern—is a thing of the past (see "Fill 'er Up"). The simple, elegant idea of labeling on-screen elements is a trend to be encouraged most enthusiastically (the Panorama database also labels its icons).

Multiple Niceties

Then there's the multiple-level Undo. Each time you use the Undo command, its wording changes to reflect your previous painting action. For example, suppose you (1) draw a rectangle, (2) fill it with a striped pattern, and (3) erase a chunk of it. At this point, the command reads Undo Erase. Choose that command, and the part you erased reappears and the command changes to Undo Bucket Fill. Select that, and the command says Undo Shape. And so on. You can't retrace your steps forever—you can usually backtrack between 5 and 10 steps—but the feature is a delight.

And consider this: How many times have you ever tried to touch up an area that was filled with gray, only to discover that your gray paint was one pixel off, leaving a crude seam between the original gray area and the new paint? This ugly situation arises when you've moved the original object; the black-white-black arrangement of dots in the gray pattern is now actually white-black-white. When you try to apply the original black-white-black gray paint, it is impossible to get the new pattern to match the old. Amazing Paint solves this problem: a Nudge command in the nifty pattern-editing window shifts the entire pattern by one pixel in any direction. Use it on the gray pattern, and you can paint over that existing gray object without fear of misalignment.

A few other unusual features distinguish the program. Where some programs, like SuperPaint, offer you a handful of selection-marquee shapes (such as diamond or oval), Amazing Paint offers a slew of them—and you can create your own. And speaking of selections, you can move the selection area around without actually moving the painting—that is, you can shift just the shimmering lasso outline as you've drawn it on the screen, without dragging any painting along with it. (This isn't a terribly useful function,

Fill 'er Up Most paint programs let you select one pattern for the outline of a rectangle and a second pattern for the inside region. They provide two or more identical pop-up palettes for making these pattern selections. Compare Amazing Paint's crystal-clear interface to other programs: see if you can figure out where you'd click to set the outline pattern and the fill pattern in each of these programs. (The palette on the right is Amazing Paint's. The others, clockwise from top, are from UltraPaint, SuperPaint, Canvas, and DeskPaint.)

but it's certainly unusual.) Finally, there's a nice billboard-printing option; you can tell the program how many sheets of paper to use to print your document (a carryover from CE's old MacBillboard program).

Not So Amazing

Amazing Paint doesn't have any fancy, UltraPaint-type high-end paint features—smudging tools, bezier curve tools, an actual-size view when you've zoomed in, adjustable dots-per-inch settings, a lasso shortcut for selecting an object by clicking, and so on. You can't make the spray can's spray area larger than the usual MacPaint spray can's ½-inch diameter. And Amazing Paint documents can't be larger than 8 by 10 inches—which is no larger than the original MacPaint document size.

But then, Amazing Paint doesn't set out to compete with such programs, and its simplicity and ease-of-use benefit handsomely as a result. Furthermore, very few of the features it *does* have cry out for improvement. One that does is the Mouse Magnifier, a unique, movable Fat Bits mode: as you move the mouse around your actual-size painting, a two-inch-square "magnifying glass" window follows your cursor. When you find a spot you want to edit, you freeze the magnification window by pressing the Spacebar. The only nit to pick: the Mouse Magnifier window doesn't scroll when you hit the edge of the main window, as all the other tools do.

The other minor annoyance is Amazing Paint's Wand tool. In the words of the sparse, slightly underdone manual, the Wand is supposed to select "the space inside shapes," whatever that means. In practice, it selects very strange, unwanted regions of your painting—that is, when it doesn't display an error message saying that the area you've selected (actually, that the Wand selected) is "too large or complex."

Finally, some computer industry analysts have observed that the MacPaint interface is essentially anti-creative: you must constantly move the mouse away from your work to change tools before returning the mouse to service. The result is a continual interruption of your artistic flow. The wonderful Studio/1 (another excellent paint program) solves this problem brilliantly, allowing you to select tools by pressing keys on the otherwise unused Macintosh keyboard (B for brush, P for pencil, and so on). Such a system allows one hand to handle tool selection and the other hand to use the mouse exclusively as a painting tool. With all the good work Amazing Paint's authors have done with the paint interface, it's astounding that they failed to employ this strategy, or one like it.

Backing the System

Except for its lack of flashy features, Amazing Paint is a state-of-the-art piece of programming. It loves MultiFinder. It works fine even if you're using a color monitor in color mode. It will support ATM and TrueType (if the latter format ever appears), which means, of course, that it's System 7.0–ready. It's fast—on any Macintosh from the 512KE upward—requires no support files to clutter up your System folder, and is smaller than 200K, which makes it useful for users without hard drives.

If you already own a paint program, there's nothing in Amazing Paint that's worth switching for. But consider it if you haven't used a paint program before. Give it to a new Mac owner as a gift. Or just study it, and hope that more programs appear that take cues from Amazing Paint's clear, efficient interface.—**David Pogue**

See **Where to Buy** *or circle 714 on reader service card*

MIDI Sound-Generating NuBus Board

MACPROTEUS 1.0

Pros: Superb sound quality; versatile mix of instrument sounds. **Cons:** Sound input and output not as versatile as in stand-alone Proteus sound module; requires Apple's VS MIDI Manager, which slows performance and isn't supported by all MIDI software; manual lacks index and basic information. **Company:** Digidesign. **Requires:** Mac II, 2MB of RAM (4MB recommended for use with sequencers and other software under MultiFinder); MIDI interface (for external control). **List price:** $895; with OpCode's EZ Vision $995.

While most people concentrate on its graphics talents, the Macintosh continues to make not-so-quiet inroads into the professional audio field. Much of the Mac's success in this area has been due to Digidesign, whose Audiomedia and Sound Tools hardware give the Macintosh II family and the SE/30 compact disc–quality recording and playback features (see *Reviews, Macworld,* May 1990).

Digidesign's latest hardware offering is the MacProteus, a musical instrument that packs hundreds of digitally recorded (sampled) instrument sounds into a NuBus expansion board. You can play a MacProteus from any music keyboard equipped with the Musical Instrument Digital Interface (MIDI), or control it using MIDI sequencer software, which lets you record and play back multiple tracks of MIDI information. (For an introduction to MIDI concepts, see "Getting Started with MIDI," *Macworld,* August 1990.)

As you'll see, the MacProteus is potentially more useful for multimedia applications than for musicians looking to expand their systems. What's more, the MacProteus requires some of Apple's latest MIDI system software, which isn't fully supported in the world of Mac MIDI software. Before deciding to buy it, you need to balance the MacProteus's sound quality and capabilities with the possibility that you may not be able to use it with your current MIDI software.

A Band on a Board

The MacProteus is a NuBus version of the E-mu Systems' Proteus, a MIDI instrument that contains a whopping 4MB of high-quality sampled stereo sounds—pianos, drums, horn and string sections, choirs, and much more. Like the Proteus, the MacProteus is multitimbral—it can simultaneously play up to 16 different sounds. By assigning different sounds to different MIDI channels and then recording multiple tracks with a MIDI sequencer program, you can create complete orchestrations that have remarkable richness and sound quality. These features combined with its $895 price tag have made the Proteus one of the most popular MIDI sound modules of the past year.

Like the Proteus, the MacProteus provides 192 sound settings, or presets. A preset is not just a single sampled sound. It's a combination of one or more sounds, with various modulation and envelope settings that control how the sounds play. For example, a preset might modify a piano sample so that it sounds at a continuous volume for as long as a note is held, rather than decaying over time. It's this ability to modify its built-in sound samples according to various criteria that makes the MacProteus so versatile.

The MacProteus shares the Proteus's sound quality, multitimbral features, and price tag, but the similarities end there. First, the MacProteus offers only two audio-output connectors (left and right channel) and one headphone jack. The stand-alone Proteus has six output connectors cleverly wired to give you great flexibility in attaching the Proteus to other instruments and audio gear such as mixers and reverberation units.

ROBERT HOLMGREN

Mike Abowd using MacProteus in his home studio.

Second, the MacProteus has no conventional MIDI In and MIDI Out connectors, which normally connect a MIDI instrument to an external MIDI keyboard. To connect the MacProteus to a Macintosh MIDI interface and any other MIDI gear, you must use Apple's MIDI Manager and PatchBay software, which act as intermediaries between the Mac's hardware and the MIDI equipment.

The MacProteus is the first Macintosh MIDI product to require MIDI Manager. It is a dubious distinction, partly because MIDI Manager slows the Mac's operation somewhat, but mostly because music programs—Passport's Pro 4 sequencer most notably—do not yet support MIDI Manager (Passport says that it will by the time you read this), and thus, cannot be used with the MacProteus. Most MIDI programs will eventually be updated to support MIDI Manager, but for now, you should verify that your favorites do support it before considering the MacProteus.

Where Are the Knobs?

Because it's a board that lives inside the Mac, the MacProteus doesn't provide any knobs for adjusting volume, instrument settings, and MIDI parameters. For these tasks, you use an accompanying program, appropriately called Front Panel. This program was developed for Digidesign by Opcode Systems, and it looks and works much like Opcode's editor/librarian utility for the Proteus. If you like the interface design of Opcode's editor/librarians and of its Vision sequencer, you'll feel comfortable with Front Panel. If, like me, you find Opcode's software powerful but a bit unwieldy, you'll long for knobs you can touch with your fingers, not the mouse pointer.

Unlike Opcode's Proteus editor/librarian, Front Panel does not let you alter the characteristics of the Proteus's presets. Front Panel is primarily a software replacement for the front panel knobs that the Proteus has. The program does, however, let you copy and paste presets created with Opcode's Proteus editor/librarian (which, by the way, does support MIDI Manager and does work with the

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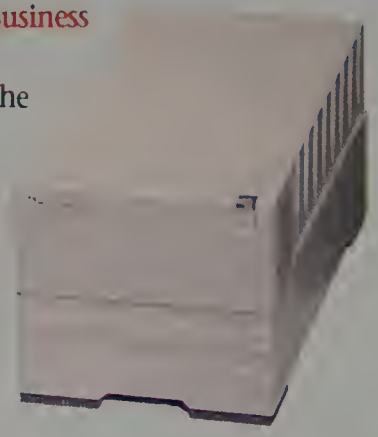

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29789 Illustrator v3.0 ..... $348
29266 Photoshop v1.0.7 ..... $498
CE Software
29274 Amazing Paint $65
Claris
29207 Cad 2.0 ..... $639
Deneba
29232 Canvas v2.1 ..... $186
29276 UltraPaint $124
Electronic Pen
29278 Visual Arts $245
Generic Software
29280 Generic CADD $372
GraphSoft
29284 MiniCad+ 3.0 ..... $589
Innovative Data Design
29286 MacDraft 2.0 ..... $192
MathSoft
29292 MathCAD $335
Paracomp
29294 Swivel 3D Professional $427
Strata
29300 StrataVision 3D $369
Supermac
29228 PixelPaint V1.2 ..... $223

3-D Graphics Made Simple

Use Paracomp's SwivelArt to create 3-D graphics for models and product prototypes. Easy to learn and includes more than 100 ready-made three-dimensional models.

Swivel Art. 29308 ..... $82

Mostly Painting

Baseline
29310 Color MacCHEESE $55
Claris
29202 Claris MacPaint 2.0 ..... $94
Silicon Beach
29224 Digital Darkroom V1.1 ..... $247
Solutions
29298 DeskPaint & DeskDraw 3.0 ..... $103

Mostly Graphics Editing

Kaetron
27832 TopDown 2.0 ..... $227
Paracomp
29900 FilmMaker $437

NEW Adobe™ PostScript for Under $1800

The new 17-font version of the TI microLaser offers all of the features of the 35-font version — less 18 resident fonts.

MacUser awarded the TI microLaser 4.5 mice and said it *"outperforms its competitors."*

TI microLaser
17-Font PostScript Printer 22856 ..... $1795
35-Font PostScript Printer 22851 ..... $1995

Graph and Chart Makers

Computer Associates
29806 Cricket Graph 1.3 ..... $127
DeltaPoint
29260 DeltaGraph v1.5 ..... $109

Presentation Managers

Aldus
29782 Persuasion v2.0 ..... $327

Certificate and Award Generators

Broderbund Software
29836 Print Shop $35
Spinnaker
29808 Certificate Maker $23

Graphic Utilities

Adobe
29848 Smart Art IV v2.0 ..... $85
Altsys
30454 The Art Importer v2.0 ..... $87
Caere
30462 OmniDraft $69
30460 OmniTrace $104
CE Software
30358 Calender Maker v3 ..... $30
Frame Technology
29864 FrameMaker 2.1 Mac $745
HyperPress Publishing
30478 Icon Factory $45
Letraset
29288 ColorStudio $635
Macromind
29258 Macromind Accelerator $124
29290 MacroMind CD-ROM $126
Odesta Corporation
30502 GeoQuery 2.0 ..... $385
Olduvai
30504 MultiClip $69
Studiotronics
29272 Colorset $209
Synergy Software
29892 KaleidaGraph $144

Graphic Art Collections

Adobe
29838 Adobe Collector's Edition 1 v1.0 ..... $78
29840 Adobe Collector's Edition 2 v1.0 ..... $129
NEC
29880 Clip Art 3D $241
29882 Image Folio $244
29884 Photo Gallery $244
29886 Type Gallery $244

Paracomp
29308 Swivel Art $82
T/Maker
29816 EPS Illustrations $83

Do It Yourself Programming

Borland
27592 Turbo Pascal v1.1 ..... $67
MicroSoft
27590 QuickBasic $64
Symantec
27582 Just Enough Pascal v1.0 ..... $48
27586 THINK C v4.0 ..... $163
Prescience
29296 Theorist $234

Master Your Correspondence

Power Up Software offers useful utilities that take charge of all correspondence. **Address Book Plus 2.0** offers the most complete way to manage and print your names and numbers. **Letter Writer Plus** is a handy Desk Accessory that puts powerful letter-writing and mail-merge tools at your immediate disposal.

Address Book Plus 2.0 30442 ..... $54
Letter Writer Plus. 30440 ..... $54
Address Book Plus/
Letter Writer Plus bundle. 29404 . $82

Create Professional Animation

FilmMaker from Paracomp gives you professional-quality animation with features such as real-time control over position, scale and rotation of animated objects, as well as full-screen anti-aliasing. And with the help of **FilmMaker** , your presentations also will take on new power.

FilmMaker (Paracomp). 29900 ..... $437

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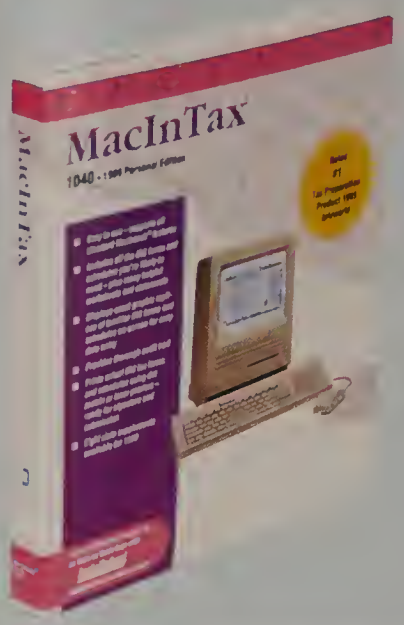

Tax Help From MacInTax

Four-time *World Class* and *Eddy* award winner! MacInTax is the best-selling tax product for the Macintosh. Loaded with new features for 1990! And MacInTax is the only tax product available that prints exact replicas of IRS forms and schedules on blank paper. Full integration with 13 optional state supplements.

MacInTax. 28502 ..... $61

DataDesk
25184 15 Function Key Module $42
25185 Mac 101 Keyboard Platinum $134
25180 Mac-101 Keyboard, AD8 ..... $134
25181 Mac-101 Keyboard Beige $134
25183 SWITCH8ALL $98
25182 SWITCH8OARD $159
Kensington
25281 Turbo Mouse AD8 ..... $107
25280 Turbo Mouse Plus $107
MicroSpeed
25285 MacTrac (SE, II, IIgs) $75
Microtouch
25287 UnMouse $185
Mouse Systems
25283 Little Mouse $77
25284 Trackball AD8 ..... $72
Seiko
23734 DT3600 Digitizing Tablet $295

Accessories

American Power
26292 UPS 110SE $207
26294 UPS 370ci $337
Applied Engineering
26917 Quadralink $205
Calcomp
26918 WIZ $157
MacAvenue
57200 5.25" Diskettes 1.2M8 10Pk $10.99
57000 5.25" Diskettes 360K8 10Pk $4.99
41753 Keyboard drawer $19
41019 Kleen Keyboard Kit $8.98
41752 Teak Keyboard Drawer $69
41601 Teak 3.5" Double Rolltop 8ox (90) $29
41600 Teak 3.5" Single Diskette 8ox (45) $17.99
Cover-Up
26909 Diskette Wallet 10pk (alligator) $7.5
26910 Diskette Wallet 10pk (blue) $7.5
26911 Diskette Wallet 3pk (alligator) $5.5
26912 Diskette Wallet 3pk (blue) $5.5
26895 Imagewriter II Dust Cover $8
26894 Mac Plus/SE Dust Cover $8

The Smaller Mouse

Smaller is better with the Little Mouse. This electronic mouse is 22% smaller than the average mouse, offers 50% higher resolution and uses 100% optical technology. Optical mouse pad included. (ADB only)

Mouse Systems Little Mouse.
25283 ..... $77

I/O Designs
26915 Neon Green SE Mac Luggage $85
26914 Neon Pink SE Mac Luggage $85
26916 Neon Yellow SE Mac Luggage $85
Inland
40504 1 Mode Surge Protector $6.64
40505 3 Mode Surge Protector $14.50
InnovativeTechnology
26905 The Library (black) $12
26903 The Library (gray) $12
Interex
26890 A/8 Box Din 8 ..... $33
39690 Full Pin, IF, 6", D825M-D825M $8.99
26281 Mac 128/512 to Hayes D89 to 25pin, 6ft $7
26282 Mac 128/512 to Imagewriter D89 to 25pin $7
26280 Mac to SCSI 25m to 50m 2ft $11
26290 Mac to SCSI System Cable, 6ft $15
26283 MacPlus Peripheral Adptr cable, 1ft $7
26284 MacPlus, SE, II to Apple Modem $7
26289 SCSI Peripheral Cable, 2ft $13

Choose the Best Monochrome

The Sigma L-View will zoom out to display your work as small as 70% or zoom in to show an image as large as 200%. Use the L-View's hot-key commands to choose one of six built-in resolution options. This low-emissions monitor also offers a fast 92Hz refresh rate that gives a flicker-free screen image.

Sigma L-View Multi-Mode 19" monitor w/card. 22008 ..... $1495

Kensington
26891 Apple RG8 Anti-Glare Filter $62
26900 Extra Long AD8 keyboard cable 3ft $24
26897 LaserWriter II Dust Cover $12
26899 Mac II Monitor Extended Kit $32
25580 Mac II Monitor Stand $62
26892 Mac II Stand and Cable Kit $63
26887 Mac II System Stand $20
26893 Masterpiece Mac II $103
26882 SE Anti-Glare Filter, (beige) $32
26883 SE Anti-Glare Filter, (platinum) $32
26884 Security Kit $33
26888 System Saver Plus, (beige) $62
26889 System Saver SE $62
25582 Tilt/Swivel $24
26896 Universal Printer Stand $15
Pace
26898 MacAvenue Carrying Case $65
26901 MacAvenue Carrying Case Ext Kbd $76

Sony
57440 3.5" Diskettes 1.44M8 (10Pk) $24.95
57401 3.5" Diskettes 800K8 (10Pk) $13.95
Summagraphics
26885 8it Pad Plus $318

Sound Interfaces

Farallon Computing
23730 MacRecorder™ $158
Passport Designs
23732 MIDI Interface $76

Software

Writing and Publishing

Word Processing, Writing

Ashton-Tate
30600 FullWrite Professional v1.5 ..... $253
Microsoft
30582 Microsoft Word v4 ..... $245
30584 Microsoft Write v1 ..... $77
Nolo Press
29888 WillMaker $34
Springboard/Spinnaker
29890 The Resume Kit $35
T/Maker
30588 WriteNow 2.2 ..... $124
WordPerfect
30591 WordPerfect Mac 2.0 ..... $234

Spelling Checkers

Deneba Software
30618 Big Thesaurus 1.0 ..... $63
Microlytics
30494 Inside Information $68
Working Software
30596 Spellswell v2.2 ..... $46

The Complete Scanning Solution

Scans from books or other originals that won't fit in the flatbed scanner. Saves in EPS, TIFF, MacPaint or PICT formats at resolutions up to 400dpi. MacUser's review said the Complete PC had "excellent OCR and the best resolution" of the hand-held scanners tested.

Complete PC Complete Halfpage Scanner. 22752 ..... $313

Print Labels Like a Pro

Avery's MacLabelPro is the answer to all your label printing questions. Includes preset layouts for shipping, diskette, or name badges — virtually any label. Also offers drawing tools, a clip art library, sequential numbering and mail merge capability. Call for information about the different labels available.

Avery's MacLabelPro v1.0. 30534 ..... $49

Page Layout Publishing

Adobe
29854 True Form v2.0 ..... $225
Aldus
29781 Pagemaker v4.0 ..... $497
Claris
29200 SmartForm Designer $291
Letraset
29868 DesignStudio $589
Springboard
29814 Springboard Publisher V2 ..... $107
Timeworks
29896 Publish-It Easy! $115

Utilities for Writers/Publishers

Caere
30466 OmniProof $104
30464 OmniSpell $69
DeltaPoint
30638 Taste $98
Lexpertise
30630 MacProof 3.2.1 ..... $115
Lifetree
30632 Correct Grammar $49
Preferred Publishers
30628 Vantage $51
Reference Software
30634 Grammatik Mac $50
Working Software
30598 QuickLetter v1.02 ..... $72
Xerox
30636 AccuText $541

Fonts and Font Utilities

Adobe
29834 Adobe Plus Pack v1.0 ..... $107
29850 Adobe Type Set 1 v1.0 ..... $58
29852 Adobe Type Set 2 v1.0 ..... $58
29268 Streamline v1.2 ..... $225
29826 TypeAlign v1.0.4 ..... $58
8roderbund Software
30450 Typestyler $115
Letraset
29870 FontStudio $455
Tactic
30520 FontShare 2.0 ..... $148

Optical Character Recognition

Caere
30610 OmniPage 2.0 ..... $535

Business Software

Integrated/Bundled Applications

Microsoft
30182 Microsoft Office 8undle $525
30580 Microsoft Works v2 ..... $177

Accounting/Bookkeeping

Aatrix
28984 Ultimate Payroll v4.0 ..... $174
28486 Graphic Arts Billing v2 0 ..... $185
Chang Labs
28490 Rags to Riches III $295

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The MacAvenue Fun Pak includes 5 packages: *Hitchhiker's Guide to the Galaxy, Leather Goddesses of Phobos, Crystal Quest, Solitaire Royale* and *Talking Moose*. A $299 value!

MacAvenue Fun Pak 29400 ..... $39.95

Make Life Better

The MacAvenue Better Living Pak gives you *Dinner at Eight* (including The Encore Edition and The Weeknight Gourmet), *QuickLetter, Synchronicity* and *Protector Shark*. Six packages worth more than $300!

MacAvenue Better Living Pak 29402 ..... $49.95

Make Third-Party Printer Connections

If you're looking for a way to connect a third-party, 24-pin printer to your Macintosh, the Orange Micro Grappler LX is the solution. Connects to Epson, Hewlett-Packard, Toshiba and other Epson 24-pin or HP LaserJet-compatible printers.

Orange Micro Grappler LX. 22853 $129

ChipSoft
28500 Turbo Tax $51
Computer Associates
28492 ACCPAC Bedford Acc. $219
DAC
28475 Light Checkbook Accounting v2.0 ..... $41
Intuit
28458 Quicken v1.5 ..... $39
Layered
28454 At Once v.1.01 ..... $283
Monogram
28464 Monogram Dollars & Sense $78
ProPlus
28494 Wall Street Investor $395
Reality Software
28496 Wealth8uilder $164
Softsync
28481 Accountant Inc. Professional $368
SoftView
28502 MacInTax Federal 1990 ..... $61
28498 Personal Tax Analyst $47
Survivor Software
28478 MacMoney 3.5 ..... $58

Data Analysis and Presentation

Paracomp
27806 Paracomp Milo v1.0 ..... $156

Database

Acius
27780 4th Dimension v2.1 ..... $511
27820 File Force $247
Blyth
27824 Omnis 5 v1.103 ..... $629
Claris
27789 Clans FileMaker Pro $216
Fox Software
27790 FoxBase II v2.0 ..... $292
27794 FoxBase Multiuser v2.0 ..... $385
Microsoft
27798 Microsoft File v2.0A $123
MySoftware
27834 MyAdvanced LabelMaker $27
27816 MyAdvanced MailList $27
Power-up
30442 Address book Plus $52
Preferred Publishers
27834 Database $67

Time and Project Scheduling

AEC
29744 Fast Track Schedule $137
29746 Information Manager $399
JAM
30480 1-4 Users-Appt Diary w/ Alarm $129
30482 4-8 Users-Appt Diary w/ Alarm $195
30484 Single User Appt Diary w/ Alarm $104
Mainstay
30488 MacFlow $124
30490 MacSchedule 2.0 ..... $125
Nolo Press
29748 For the Record v2.0 ..... $29

Office Productivity Programs and Utilities

Borland
30456 SideKick 2.0 ..... $69
Microsoft
30496 Microsoft Mail $85

Spreadsheet Programs/Templates

Informix
30184 Wingz V1.1 ..... $245
Microsoft
30180 Microsoft Excel V2.2 ..... $245

Communications

On the Modem

CE Software
27696 Quickmail 10 Pack v2.2 ..... $313

A Database Fit for a Pro

FileMaker Pro automates a series of tasks and quickly relates data from several files at once. Supports color and includes drawing tools so forms, reports — even presentations — are a snap.

FileMaker Pro. 27789 ..... $216

Insignia Solutions
27722 Access PC $81
Microcom
27708 Carbon Copy Mac $119
Microsoft
27680 MS Mail 20 Pack v2.0 ..... $959
27678 MS Mail Server $246
27676 MS Mail Workstation $83
Prodigy Services
27726 Prodigy Startup Kit $27
Software Ventures
27660 Microphone II v3.0 ..... $213
Solutions
27728 8ackFax $137
27712 Faxgate Plus $237
Tops
27686 NetPrint v. 2.0 ..... $115
27683 Tops Network 8undle/Mac $188
Traveling Software
27710 LapLink Connectivity $119

On the Network

Dataviz
27718 MacLink Plus $118
Farallon Computing
27666 Timbuktu™ 3.0 ..... $95
Insignia Solutions
27714 Soft PC 1.3 ..... $245
27716 Soft PC AT/EGA $125
Traveling Software
27738 Laplink Network Pak $183

Sophisticated Screen Saver

After Dark is the Macintosh screensaver that gives you 30 visual options — from whimsical flying toasters to colorful fish swimming across the Mac screen. Or combine images in a multi-mode setting. Also lets you draw your own screensaver image or use a company logo.

After Dark v2.0. 30425 ..... $24

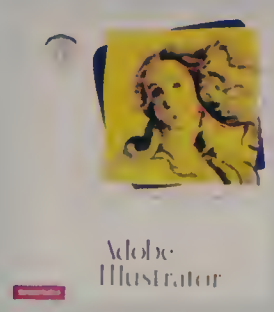
Education and Entertainment

On the Learning Curve

Broderbund Software
27958 Type! v1.0 ..... $18
Davidson & Associates
27968 Math 8laster! v1.0 ..... $29
Franklin Software
28024 Language Master $59
Goldstein & Blair
28026 Mac 8ible, 3rd edition $22
28028 Mac 8ible (Super) $28
Great Wave
27990 KidsMath v1.1 ..... $25
27988 KidsTime v1.2 ..... $24
Help Software
28038 Desktop Help for Excel $48
Individual
28030 Training for Pagemaker $38
Learning Company
28000 Reader Rabbit v2.2 ..... $31
28002 Talking Math Rabbit $31
Sensible Software
28010 Sensible Grammar $50
Simon & Schuster
28008 Typing Tutor $28
Visionary Software
28040 Synchronicity $39

Just for the Fun of It

28750 Stupid Mac Tricks $16
Accolade
28688 Hardball $25
28690 Mean 18 ..... $25
Activision
28700 Cosmic Osmo $40
28698 Manhole (CD ROM) $34
8roderbund Software
28668 Ancient Art of War $25
28670 Ancient Art of War at Sea $25
28666 Shufflepuck Cafe $22
28678 SimCity V1.1 ..... $28
28664 Star Wars $23
28672 Where Carmen Sandiego $28
28674 Where Europe Carmen $28
28676 Where USA Carmen $28
Bullseye
28682 Fokker Tri-plane V2.02 ..... $25



Hire a New Illustrator

With new text handling ability, graphics tools and charting ability, Adobe Illustrator 3.0 has grown up into a complete page-design program. The graphics package of choice for professionals!

Adobe Illustrator 3.0. 28789 ..... $323

Casady and Greene
28752 Mission Starlight $29
28754 Sky Shadow $29
Centron
28758 Casino Master $38
28760 Casino Master Deluxe $43
Electronic Arts
28654 Bard's Tale $30
28656 Chuck Yeager Flight Simulator $30
28652 Reach for the Stars $25
28740 Pipe Dreams $17
MicroProse
28742 Pirates! $94
Mindscape
28632 Balance of Power 1990 ..... $31
28636 Deja Vu II $30
PCAI
28708 MacGolf $33
Premier Technology
28744 NetTrek $35
28746 Strategic Conquest Plus $35
Sierra-On Line
28724 Kings Quest 1 ..... $28
28726 Kings Quest 2 ..... $28
28728 Kings Quest 3 ..... $28
28714 Leisure Suit Larry I $23
28712 SpaceQuest II $28
Silicon Beach
28648 Apache Strike $31
28646 Beyond Dark Castle $33
Software Toolworks
28658 Life & Death $31
Spectrum Holobyte
28614 Falcon V2.2 ..... $30
28606 Tetris $18
28604 Wellris $19
Spinnaker
28616 Sargon IV $29
The Software Toolworks
28748 Chessmaster 2100 ..... $31
XOR
28628 MacGolf Classic $51
28756 MacSki $38
28630 NFL Challenge V1.2 ..... $54
28626 Road Racer $39

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Opcode Systems
30452 EZ Vision $95
30540 Pro Plus Interface $50
Passport Designs
30506 Encore $405

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WealthBuilder by *Money* magazine (Reality Software) 28496 ..... $164

A Computerized Casino

If you can't afford a quick trip to Las Vegas, Centron's Casino Master will give you all the thrills of gambling with no risk of losing money. Roulette, Blackjack, Poker, Baccarat , Craps— all your favorite games. Complete with betting strategies, hints, odds and more.

Casino Master. 28758 ..... $38
Casino Master Deluxe. 28760 ..... $43

Safety, Maintenance and Repair Utilities

Data Organization

CE Software
30354 DiskTop 4.0 ..... $63
ICOM Simulations
30408 On Cue 1.3 ..... $36
On Technologies
30434 OnLocation v1 ..... $75

Data Storage, Management/Repair

ALSOFT
30422 DiskExpress II 2.04 ..... $54
Bravo
30458 SPAMM $47
Central Point
30365 Mac Tools Deluxe $79
Fifth Generation
30404 FastBack 2.1 ..... $116
Fifth Generation
30474 Fastback II $117
Microseeds Publishing
30378 Redux v1.6 ..... $51
Symantec
30340 Sum II V2 ..... $98
30436 Norton Utilities for the Mac $79

Shortcut and Time Saving Utilities

Central Point
30362 Copy II Mac v7.2 ..... $24
Fifth Generation
30388 SuperLaser Spool $92
Zedcor
30524 DeskWorks $228

Screen Saver Utilities

Berkley Systems
30425 After Dark v2.0 ..... $24
Fifth Generation
30399 Pyro 4.0 ..... $25
Ibis Software
30538 Protector Shark $31

Virus Detectors and Eradicators

Microcom Software
30413 Virex v2.7 ..... $53
Symantec
30342 SAM V2 ..... $63

Other Utilities

Aladdin
30446 Stuff-It Deluxe v1.0 ..... $62
Avery
30534 Mac Label Pro v1.0 ..... $49
Baseline
30542 INIT Manager $35
28762 Talking Moose $23
CE Software
30357 QuicKeys v2.0 ..... $94
Conectix
30468 Virtual (030) $118
Dayna Communications
30470 DOS Mounter $55
Fifth Generation
30388 LaserSpool v2.02 ..... $92
30402 Suitcase II 1.2.3 ..... $47
GDT Softworks
30448 Print Link Collection $58
30476 Jetlink Express $88
Insight Development
30428 MacPrint 1.2 ..... $94
Mainstay
30492 Capture $48
Now Software
30498 Now Utilities 2.0 ..... $75
30500 Prototype 2.1 ..... $184
Wildflower
30530 SnapJot 2.0 ..... $31
Williams & Maclas
30532 My Disk Labeler III $49
30536 Sticky Business 1.2 ..... $65

Simplified List Management

MyAdvancedMailList is an easy-to-learn package that gives you more effective control over your mailing list. Prints labels, addresses envelopes and creates a report that interprets your data. MyAdvancedLabelMaker prints single labels or complete sets in multiples of 9,999.

MySoftware
MyAdvancedMailList 27816 ..... $27
MyAdvancedLabelMaker 27834 ..... $27

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- If we have to split an order into two shipments, you will be charged only once for shipping.
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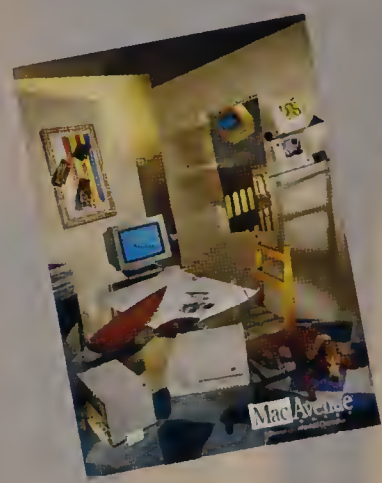
- Corporate and institutional purchase orders accepted, $500 minimum for the first order, $50 thereafter.



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MacProteus). Some sample presets are included with the MacProteus. Of the MacProteus's 192 presets, 64 can be modified using the included editor/librarian utility. You can create your own preset in order to combine certain instruments or create a special effect, such as a piano that changes into a flute halfway through each note.

Modifying presets requires some familiarity with the MacProteus's internal design, and the manual won't help. Unlike E-mu Systems' manual for the Proteus, the MacProteus manual contains little basic information on how presets are structured and modified. These important details are present in the manual that accompanies Opcode's Proteus editor/librarian, but not in a format a MacProteus novice will find useful. Fortunately, the MacProteus's 64 modifiable presets sound so good you may not want to change them at all.

Musicians Need Not Apply

On the surface, the MacProteus seems like a great add-on for the musician with a Mac II—a way to expand a MIDI system without having to find room for another box. But the stand-alone Proteus makes more sense for musicians. It has real knobs that allow you to adjust settings without starting up a program, it doesn't require a Mac in order to operate, and you can modify its presets (albeit with some effort) without an editor/librarian utility. The Proteus isn't wedded to Apple's MIDI Manager, and its superior system of outputs gives you more flexibility in connecting other gear.

The MacProteus's real future may lie in the multimedia, mainly because MIDI sequences use a small fraction of the disk space required by digitally recorded audio. By using the MacProteus to play back sequences from within MacroMind Director and other multimedia applications, you can add CD-quality stereo music to a production without the astronomical storage requirements of digital audio. You can also choose from the growing library of prerecorded MIDI sequences offered by many companies.

The MacProteus would also be valuable in a recording studio that uses a Mac as an audio workstation. By combining a MacProteus with Digidesign's Audiomedia or Sound Tools hardware and Sound Designer II or Deck recording software, you could create and edit digital recordings—all without getting up from the Mac.—**Jim Heid**

See Where to Buy or circle 742 on reader service card.

Color-Separation Program

ALDUS PREPRINT 1.0

Pros: Direct, simple, and helpful for beginning color publishers; adequate default settings and selections. **Cons:** Produces moiré patterns on TIFF files; doesn't print collated color film for consecutive pages, resulting in some registration problems. **Company:** Aldus Corporation. **Requires:** Mac SE/30; 2MB of RAM; 40MB hard drive; System 6.0.2. Color monitor and color video board recommended. **List price:** $495.

I have to confess at the outset that I have a fundamental problem with Aldus's release of PrePrint. I've always believed that color-separation capabilities should be bundled into PageMaker itself, as they are with PageMaker's competition. Producing color separations is getting to be a big deal for more and more desktop publishers—having to spend $495 over and above what you pay for an advanced page-layout program does many loyal PageMaker aficionados an injustice. While Aldus did send PrePrint free to most registered PageMaker 3.02 users, and while the company offers a generous rebate program, these still don't compensate for having to go to a second piece of software for capabilities that should be built into any advanced page-layout program.

Now that that's off my chest, I'll put aside my prejudice and set out to evaluate PrePrint for what it's being sold as: "the quickest and easiest desktop solution for producing quality separations for your publications," according to the manual.

That claim is somewhat overblown. For simple color—especially color spec'd within PageMaker itself, such as color type, color tints without gradation, and color lines—PrePrint performs quickly and adequately.

To separate a file via PrePrint, you first need to print the file to disk using the For Separations button in PageMaker's PostScript print options dialog box. These disk files can be opened from within PrePrint. You then select Print from PrePrint's File menu. The Print dialog box's Option button takes you to another dialog box, where you can specify myriad possibilities, including overprinting colors, spot colors as a fifth plate or spot colors as process colors, various printers or imagesetters, several versions of PostScript, various line-screen frequencies and screen angles for all colors, positive or negative images, and emulsion up or emulsion down.

Better for Beginners

While Aldus emphasizes that PrePrint is not a photo-retouching or color paint program, the program includes some default settings and optimization tools. The menus for selecting line-screen frequencies and screen angles include settings for a variety of printers and imagesetters and are especially helpful. Simple image-control features for softness, brightness, sharpness, and contrast are useful for beginners who would otherwise be intimidated by the usual histograms and saturation bars that appear in other color-correction programs.

The Press options menu also helps control, in a limited way, dot-gain compensation, gray-component replacement, and undercolor removal. These are all important factors in getting a printing press to produce

(continues)

Convenience Store Color Correction While Aldus PrePrint is not a photo-retouching program, the Image menu has a number of selections designed to optimize the image on preset color correction algorithms. The resulting images are adequate for beginning color publishers.

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End Users Circle 294 on Reader Service Card
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Introducing the Interfax 24/96

PrePrint whizzed through pages with only PageMaker-specified color. The color PICT image in the lower left-hand corner wasn't so lucky: it turned black and white.

Add a FreeHand EPS file to the page and you get adequate output, provided you have the time to spare.

Add a 24-bit TIFF file and not only will you need more time, you'll also need lowered standards. Notice the moiré patterns.

what you expect from your desktop.

Perhaps the best feature to come with PrePrint is the HyperCard-based calibration software. By printing sample grays on the imagesetter of your choice, you can change the matching PrePrint printer-description file *without* calibrating the imagesetter. The results I got yielded screen densities accurate to within half a percent.

PrePrint doesn't separate any color PICT files placed in PageMaker (it prints color PICT files in black and white only). While this can be inconvenient, there's a fairly straightforward workaround. Simply open the PICT file in a program like Photoshop or ColorStudio and save it as a TIFF (tagged-image file format) file. This is satisfactory for producing screen shots, where the subtleties of color might not be so important, but illustrations from programs such as PixelPaint can suffer in the translation.

A Bust for Big-Time Color Separation

Pages limited to PageMaker-created color were processed quickly and without problems. While the addition of complex encapsulated PostScript (EPS) files didn't choke PrePrint, it did add to the processing time.

PageMaker 3.02–created separation files (ranging between 2MB and 4MB in size) with TIFF graphics wouldn't pass through PrePrint at all. PageMaker 4.0 has apparently solved this problem with placed TIFF files—the price to pay being more processing time to handle the TIFF images.

But TIFF files are a problem, specifically color TIFF files made from continuous-tone, photographic images. All the scanned photographs I placed as TIFF files produced moiré patterns. Also, the separated and printed images generally looked washed out, pointing to a problem with PrePrint's color saturation controls.

Incomplete and Unusable

PrePrint's biggest problem is the curious way it prints film from an imagesetter. In the case of my four-page PageMaker test file, PrePrint printed all the cyan pages first, followed by all the magenta, all the yellow, and then all the black pages.

Any production person who has used Mac-driven imagesetters knows the headaches that result from not printing, in order, all the color film for the same page. In the imagesetter printing process, film from a single roll can be stretched or misfed. With PrePrint's printing strategy, this could prove disastrous: twice I encountered registration problems that were the direct result of film for the same page being printed meters apart.

Another problem was brought to my attention by the service bureau I use. During the first run with PrePrint, a rush job came in that caused the bureau to cancel printing my pages. The result was that none of my pages were complete because the operator canceled in the middle of printing the second color. I was left with four pages of cyan, two pages of magenta, and no yellow or black pages—an incomplete and unusable run, as opposed to what could have been an incomplete but still partially usable run.

My conclusions about Aldus PrePrint are based on my experience as a professional color publisher as well as my memories of life as a beginning color publisher. I would have loved PrePrint three years ago, when I was just learning to produce color from the desktop. Aldus's forte has always been its great, intuitive user interface, and PrePrint's simple but well-structured menus and dialog boxes are glowing examples. A beginning color publisher doesn't have to sweat the details; the default settings and image-control features (sharpness, contrast, and so on) are all helpful in producing adequate color from the desktop, assuming you don't mind a moiré pattern here and there and you don't have to print more than three pages at a stretch.

But professional color publishers be warned: Problems with moirés and the order of color film printed for a series of pages are indicative of Aldus PrePrint's limitations. I couldn't confidently use PrePrint to produce a magazine like *Macworld*. Still, beginning color publishers may find PrePrint somewhat helpful.—**Luis Camus**

See Where to Buy or circle 713 on reader service card.

On-Screen Recording and Editing Tool

MEDIATRACKS 1.0

Pros: Videotape analogy is ideal for creating software demos and training materials; flexible wait-for command and actions definitions allow point-and-click creation of button-driven, multilevel presentations with no scripting; has simple, effective links to HyperCard. **Cons:** Records screen activity only in black and white.
Company: Farallon Computing.
Requires: Mac Plus. Hard drive recommended. **List price:** $295; Multimedia Pack $495; Multimedia Pack CD-Rom $495.

Farallon Computing's new MediaTracks package is aimed at anybody who needs to create presentations such as self-running product demos, interactive help systems, or software training tapes quickly and easily. It is a set of simple tools that allows you to produce and edit a virtual videotape of Mac screen activity; break it up into clips; and add text, graphics, sound, and buttons to the clips. Buttons control playback of clips and trigger sounds, text and graphics can appear and disappear during a clip, and you can set all of this in motion without any scripting. You can save the finished presentation in a stand-alone format that doesn't require a separate application to be played, or using the included XCMDs, you can play presentations from HyperCard.

It all adds up to a reasonably compact, very straightforward system for creating interactive presentations. The package consists of the ScreenRecorder desk accessory, which captures in real time anything that appears on the Mac screen, plus the MediaTracks Editor and MT Player application, which let you edit and play back presentations.

Step One: ScreenRecorder

The ScreenRecorder DA (and accompanying INIT) is a simple utility that creates a disk file and records screen actions into it. You can pause while recording—for example, to perform actions that don't need to appear on the tape—and set the screen size so that you can record a tape on a large screen and display it on a smaller monitor. Another option controls whether ScreenRecorder captures actual bitmapped screen graphics or simply records the QuickDraw commands that generate them. Recording only the QuickDraw commands frees up some RAM and processor time, but this method doesn't work properly with programs that bypass QuickDraw and draw directly to screen memory (many paint programs, for example).

Unfortunately, ScreenRecorder captures screen images only in black and white. Although capturing 32-bit color images to disk in real time is too much to hope for, it would be great to be able to record in an 8-bit color, QuickDraw-only mode that would capture—things like color buttons and text fields—from software that has simple color capabilities.

Step Two: MediaTracks

The heart of this system is the deceptively simple MediaTracks editor, which you use to edit and add graphics, sound, and buttons to the videotapes created by ScreenRecorder. The first step in turning a screen sequence into a presentation is to divide it up into "clips," because you will attach graphics, sounds, and buttons to individual clips. The main window displays a time line showing the first frame of each clip; a time ruler runs across the top of the window; and the sound track across the bottom (see "The Clip Parade"). The amount of time each clip occupies is proportional to its length on the time line, and a slider lets you compress or expand the horizontal time scale to see more clips at once. There is also a Catalog-View setting that causes all clips to be shown at the same size, so you can see an overview of your presentation.

If a sound is assigned to a clip, a loudspeaker icon appears in the sound track strip, with a sound wave graphic representing the length of the sound relative to the length of the clip. You can alter the playback speed of each clip, so you can speed through any portions of the tape that appear slow because of disk access. Clips, sounds, graphics, and buttons can also be named, and can be cut, copied, and pasted between open MediaTracks documents.

Interactive Activity

MediaTracks' interactive capabilities are surprisingly easy to set up; simple pop-up selectors let you choose "wait for" conditions at the start or end of each clip, and actions that occur when you click on a button or a clip ends (see "Button Info"). At the beginning or end of each clip the program can freeze-frame and wait for the user to click on a button, wait until a sound has finished playing, or wait for a specified number of seconds before continuing. The end-of-clip actions can make the program stop, play a segment (a group of clips) of the current tape, play an entire external tape, replay the current segment, or exit to the clip that triggered playback of the current segment.

Clip actions work with the user-configurable buttons, which can have

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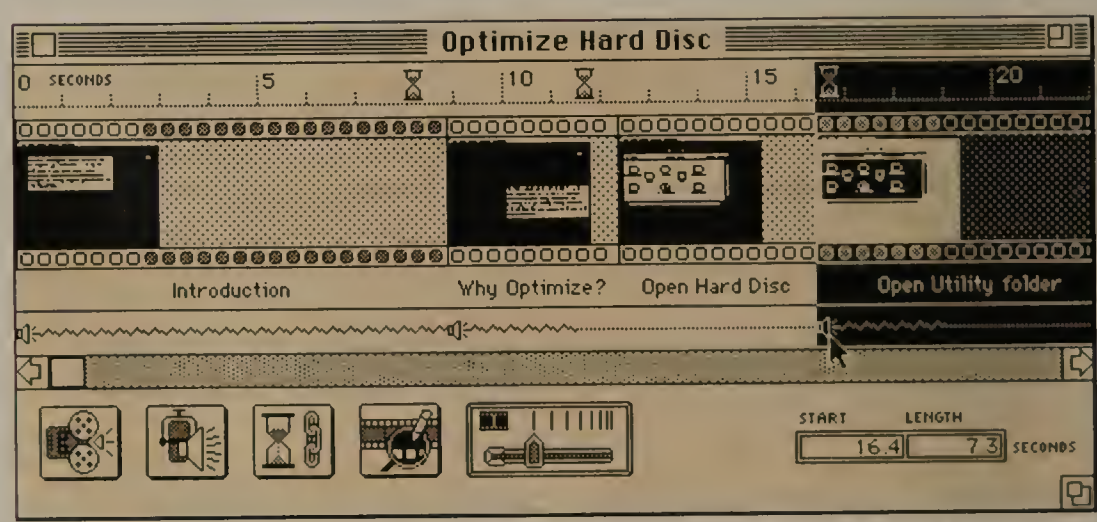

The Clip Parade MediaTracks main editing window, with the time-line display showing the first frame of each clip. The loudspeaker and sound wave icons show the length of sounds assigned to clips, and an hourglass in the time ruler at the top indicates a pause. Each clip can be named, and the info box at lower right shows the start point and length of each clip.

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Circle 356 on reader service card

Button Info MediaTracks Button Info and Actions dialog boxes let you set up branching, interactive presentations without any scripting whatsoever.

most of the visual attributes of HyperCard buttons. A button can be set to perform an end-of-clip action or pause/continue, play, stop, quit, skip ahead or back one clip, jump to any other clip, play a sound, or execute a 256-character HyperTalk script. You can create very complex presentations, complete with point-and-click menus that branch to other segments, sounds synchronized to screen action, and viewer-operable play controls.

Graphics overlays are added from a drawing window. Objects can be filled with patterns or any of eight colors, and color graphics can be pasted from other applications. An excellent feaure lets you set any object's duration, so that it either appears for the length of the clip or disappears after the initial freeze-frame. You can have text boxes and arrows appear while the program is paused and waiting for a sound, mouse click, or time interval, and have them disappear when playback resumes, all within a single clip.

Sound Bites and HyperCard Links

If you have Farallon's MacRecorder hardware unit (included in the MultiMedia Pack), you can record sounds and attach them to a clip or button. Or, you can import sounds saved in Farallon's SoundEdit format, the AIFF format (used by professional sound-editing programs); or as snd resources in other documents, such as HyperCard stacks.

You can trigger playback of MediaTracks presentations from within HyperCard by means of the included MTPlay XCMD, which executes a portion of the MT Player application (the tiny program that serves as a playback engine and control panel for presentations). Adding a Play Tape button to a stack is a matter of pointing and clicking, since Farallon provides a stack containing the XCMD and self-installing buttons.

The Last Word?

The MediaTracks system isn't the big daddy of multimedia software, but this is what makes it so appealing. A lot of people simply need to create software demos and training materials, and with the ability to integrate presentations into HyperCard stacks and add a soundtrack so easily, MediaTracks is the perfect solution. It's a drawback that ScreenRecorder can't capture any color screen activity, since a lot of applications that need an interactive demo make use of color in some way, if only for buttons and text fields. Even so, the MediaTracks system is well designed, extremely simple to operate, and quickly learned. It may not be the last word in multimedia, but if you create presentations that need to show the Macintosh in action, MediaTracks is the right word.—**Charles Clouser**

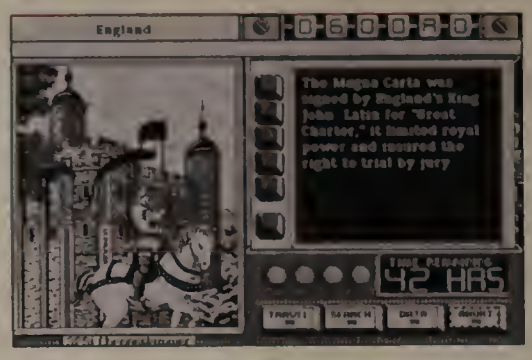
See **Where to Buy** *or circle 747 on reader service card.*

Educational Adventure Game

WHERE IN TIME IS CARMEN SANDIEGO?

Pros: Nice graphics; entertaining; provides direct link to encyclopedia use.
Cons: Clues can be repetitive.
Company: Brøderbund Software.
Requires: Mac Plus. **List price:** $49.95.

Brøderbund Software's success at educational adventure games started with Where in the World Is Carmen Sandiego? and continued with Where in Europe and Where in the U.S.A. Rather than continue the series with the metaphysical game Where in Hell Is Carmen Sandiego? (complete with religious clues from Dante's Inferno), the company has elected to forge ahead instead into history, with Where in Time.



Crime Time The "Where in Time Is Carmen Sandiego?" screen gives you some graphics and historical facts. Clicking on the Data button lets you fill out an arrest warrant, while Search gives you clues about the identity of a crime suspect and his or her escape trail through history.

Crime through the Ages

As with the other Carmen Sandiego games, a reference book comes with the program. In this case it's a special copy of the *New American Desk Encyclopedia*. Also, in standard Carmen style, you act as a detective on an assigned case, looking up information in the reference book to follow clues about a fictional crime.

If you are familiar with the other games, you can start playing in a few minutes. In a test using some absolute newcomers to the series, though, players expressed confusion about the details of signing up in the Acme Detective Agency and getting the game under way. It also wasn't clear to most of the test group whether there was a time penalty for looking up reference clues slowly, or whether there was a particular strategy to use in navigating the path of clues.

Once the play starts, though, Where in Time is quite entertaining. You're assigned a case and must collect enough clues about a suspect to get an arrest warrant issued and then find the suspect in time. Each screen in the game presents a historical place and time. At each place you can call on informants or witnesses who offer clues about the suspect's identity and hints about the next time and place to track the suspect (see "Crime Time"). Playing the game means, basically, deciding where to travel in time using the clues, the encyclopedia, and your own information about history. If a clue says, for example, the suspect has stolen something from Francisco Pizarro, you click on the Travel button on the Chronoskimmer

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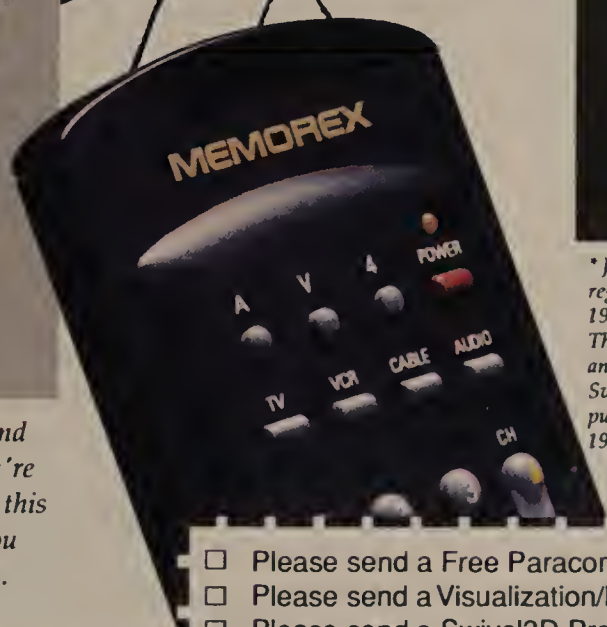

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Circle 229 on reader service card

and look for a button corresponding to sixteenth-century Peru. Since the entries in the encyclopedia are short, just a paragraph or two, it's not hard to find the linkage from Pizarro to Peru even if you don't know that bit of history. As you jump from one time and place to the next, the program forces you to look up lots of history you might otherwise have missed. When you finally track down and arrest the suspects, you return to the Acme Detective Agency for promotions and more challenging cases.

Carmen Meets Mac

This program is huge, by game standards. The program file takes only 315K as an application, but uses nearly 1MB of color graphics files or 550K of black-and-white images, depending on your hardware. Under MultiFinder, Where in Time calls for a 1500K partition. If you want to play the game as a break from working on a real application, you need more than 2MB. Despite Where in Time's size, with a little bad luck you can run into amazingly repetitive game sequences. One of the test group, for example, found that he encountered the same little fact-note about Meiji-era Japan 20 times in a single afternoon. Fortunately, if you catch enough time-traveling criminals you are promoted to more complex, and less repetitious, adventures.

It's Catching

At roughly the level of difficulty of a ninth-grade world-history text, this game is clearly aimed at a school-age population. Players over the age of 25 in the test group, however, found it a brisk refresher in history basics. Besides being helpful on simple matters ("Who was president when Napoleon sold us Louisiana?"), this game is strong on history of non-European cultures. Since Asia, Africa, and the early Americas were lightly covered in older textbooks, Where in Time holds lots of fascinating new material for players who haven't seen a textbook in more than a decade. Although the mechanics of play could be streamlined a bit, and a help feature would be nice, for the price it's an unbeatable entertainment-and-education combination.—**Mary S. Toth**

See **Where to Buy** *or circle 776 on reader service card.*

Laser Printer–to–EtherTalk Link

ETHERPRINT

Pros: Simple setup and configuration. **Cons:** None. **Company:** Dayna Communications. **Requires:** LaserWriter or similar printer with AppleTalk port; Ethernet cable. **List price:** $499.

Users migrating to heavy-duty Ethernet networks often face the problem of connecting their LaserWriters to the network. The LaserWriter's only network connection is the standard LocalTalk port, which requires a router to connect to an EtherTalk network. But a router can be costly and seems like overkill just to connect a LaserWriter. Dayna's EtherPrint is hardware specifically for connecting a laser printer to Ethernet; it's just what the doctor ordered—simple to set up and inexpensive.

The EtherPrint is a small, modem-size box with four connectors on the back and two diagnostic LED displays on the front. One connector is for LocalTalk (for connecting to a printer), and three are for Ethernet—one for thick-wire cable, one for thin-wire cable, and the other for unshielded twisted-pair cable. The LEDs indicate when the EtherPrint's power is on and when there's network activity to the attached printer.

I doubt there's a simpler way to install a LocalTalk–EtherTalk connection. Just plug the LaserWriter or similar printer into the EtherPrint's LocalTalk port, plug the Ethernet cable into the proper Ethernet port, and plug in the EtherPrint's power converter (similar to those normally found with modems). Watch for the sequence of turning on the devices—the EtherPrint should be turned on before the LaserWriter, or the EtherPrint box may not detect the printer.

MARK JOHANN

The Dayna Communications EtherPrint

A bank of four switches on the back of the EtherPrint box controls the device's configuration. You might have to change the switch settings to meet the requirements of your network. Only three switches are used: one sets the printer's LocalTalk address to the normal address range of 128–255 or to the nonstandard 1–127 (which some devices require), another selects either thin-wire or thick-wire Ethernet, and the third switches between AppleTalk Phase 1 and Phase 2 protocols. The factory settings for these switches are for a LocalTalk address range of 128–255, thin-wire Ethernet, and AppleTalk Phase 2 protocols. (The only change I made was to switch to Phase 1 protocols.)

To save you scrounging for the right cable, the EtherPrint ships with two cables for connecting to a laser printer—one for the older LaserWriter series (DB-9 on one end, DIN-8 on the other), one for the LaserWriter II series (DIN-8 on both ends).

If you use AppleTalk Phase 2 protocols, the EtherPrint and its laser printer show up in the default network zone you define when you set up the Phase 2 router. To change your LaserWriter's zone, you must notify Dayna. It will send you the software for changing the zone of the EtherPrint.

Software routers like Apple's AppleTalk Internet Router ($399) or Farallon's Liaison ($399) are less expensive than the EtherPrint ($499), but they require a Mac. You can install a software router to run in the background on a server, but you're still subject to system crashes. On the other hand, if you choose a hardware router, the choices are pretty expensive. Devices like the Shiva FastPath, the NRC MultiGate, and the Cayman GatorBox offer more functionality than mere laser printer connections and cost from $1500 to $2800.

If you've been waiting a long time for an Ethernet connector for laser printers, EtherPrint meets a real need at the right price. And since it ships with software for connecting a printer to a TCP/IP network, it's even more of a bargain and should be used on more networks.—**Dave Kosiur**

See **Where to Buy** *or circle 733 on reader service card.*

Strategy Game

DARWIN'S DILEMMA 1.0

Pros: Simple rules; good color icon. **Cons:** None. **Company:** Inline Design. **Requires:** Mac 512K; System 6.0.1 for sound. **List price:** $49.95.

If you ever wanted to play God, here is your chance. Darwin's Dilemma from Inline Design gives you the tools to create humankind all over again.

A simple game with simple rules, the object of Darwin's Dilemma is to merge like creatures to create new life forms. You use mouse clicks to move an icon that looks like Darwin (after clicking on the icon, you move the cursor to the spot where you'd like Darwin to be and click again). After you maneuver Darwin next to a creature icon that you want to move, clicking on the creature pushes it—horizontally if Darwin is on either side of the creature, vertically if Darwin is above or below—till it meets another icon. When like creature icons collide, they merge; when unlike icons collide, they stop without merging. After the like icons have merged, the result is a new higher life form. Using the collision rules thoughtfully, you can maneuver creatures so that merging is easy. You advance to the next level and to a new stage of evolution after you merge all like icons.

Survival of the Fittest

Before haphazardly moving icons around, however, you must determine a workable strategy for efficiently completing the level. Without prior planning you can end up with isolated icons that cannot merge or with clusters of icons, which you cannot move. An isolated icon can be a problem; because there are no icons for it to run into either vertically or horizontally, if you push it in any direction the icon wraps around the screen until it runs over Darwin. (Natural selection is not the rule here; Darwin has an infinite number of lives—only your score is damaged.) Clusters are an even more frustrating problem because there is no way to push an individual icon out of a cluster.

The designers did not forget us, however. To get out of tight messes where all the unlike icons are back-to-back or where no two icons are in the same horizontal or vertical track, you can choose to teleswap. A teleswap allows you to change the position of Darwin and any other icon on the screen. With a single teleswap (and some luck), you can break up a large cluster. You are, of course, allotted a finite number of teleswaps, so frugality is the best policy.

Strategy is the essence of this game. Careful planning before beginning a level can mean the difference between winning triumphantly or quitting in frustration. I found that most levels can be completed with only one or two teleswaps. After you complete a level you get two more teleswaps, and believe me, you'll need them for the clusters from hell on levels 10 and 20. In one game, I managed to save up to 18 teleswaps before getting to level 10, where I needed 5 teleswaps to merge all the icons. Luck also helps. Some games are relatively easy, while the same level in other games can be dreadfully hard.

The user manual includes a brief but invaluable section on strategy. Suggestions on how to break up clusters and conserve teleswaps, as well as on how to avoid multiplicity (a particularly nasty pitfall), remove a lot of the game's initial frustration. You still need to be careful of icons that do not merge and extra icons that do not need to be merged to complete the level—features mentioned only briefly in the manual.

The Galápagos Islands Not a pretty situation, only the octopus and the solitary eukaryote (starlike icon) can be moved. The eukaryote can be pushed up or left to merge. The octopus is isolated and must be teleswapped. The clusters of unlike icons must be broken up by careful teleswapping.

Improving on Evolution

Darwin's Dilemma is an intriguing game, but I don't see anyone using it to occupy spare minutes between phone calls after the initial novelty of the game wears off. After the six hours it took me to complete the game, I wasn't terribly interested in starting a new game. (But I have spoken to many people who play the game over and over trying to better their score.) Darwin could be played for speed, but only by the truly addicted. Another alternative might be to treat it strictly as a puzzle.

An editable form of Darwin's Dilemma, where players could create nasty puzzles of their own to stump their friends, might prove to be more interesting than the game itself. At this point, you can save your games, and therefore any situation you happen into, but you cannot create obstacles or define rules to create truly puzzlesome situations.

Another possible diversion is to customize the game yourself. All of the creatures are saved as color icon resources. If you have a utility that allows you to edit color icon resources, you can set up your own evolutionary tree. You might re-create the hierarchy of the British throne, or the managerial hierarchy in your company. Of course, be sure to work on a copy of the program (Darwin is not copy protected), and be sure not to offend. Your boss may not appreciate being lower than an amoeba on your evolutionary ladder.

You must, however, conform to Inline's clever hierarchy of evolution. The creators of Darwin's Dilemma make no attempt to accurately represent the accepted evolutionary tree or to ensure that the ancestral line is unbroken from level to level, but they do hold to basic evolutionary categories. One interesting exception to the whole concept of the game, however, is that Adam and Eve are used to represent modern man.

No matter what your religious affiliation or your scientific background, Darwin's Dilemma is a fun, highly addictive game well worth a look. Just remember—especially on the tougher levels—you're only human.

—Tim Warner

See **Where to Buy** *or circle 724 on reader service card.*

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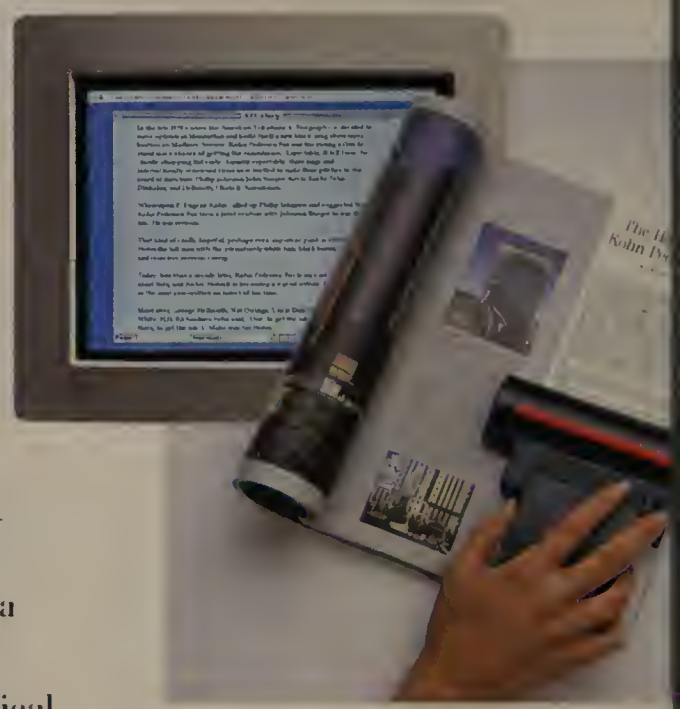

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Macs to UNIX over TCP/IP

TCP/CONNECT II 1.0

Pros: Simple, easy-to-use interface to Netnews; easy-to-use interface for FTP file transfers; supports the three major types of terminals; includes support for defining and saving macros; can be purchased with minimum number of features for infrequent user, or many advanced features for heavy-duty user. **Cons:** Configuration can still seem overwhelming, especially to a novice; first version has problems with Netnews browsing. **Company:** Intercon Systems Corporation. **Requires:** Mac Plus; second disk drive; Ethernet or LocalTalk connection. MultiFinder recommended. **List price:** $495.

Transmission Control Protocol/Inernet Protocol (TCP/IP) networks, long a mainstay of the academic community, have proved to be a popular way to connect different types of computers in corporate environments as well. One of the first programs available to Macintosh users to link to computers running TCP/IP was the public-domain NCSA Telnet from the University of Illinois. At least one of NCSA's authors contributed to a commercial version, TCP/Connect from Intercon Systems. Now a newer version, TCP/Connect II, offers a host of new features that make the program a powerful tool for using TCP/IP networks.

The LineUp

TCP/Connect II offers the same basic features as TCP/Connect. Thus, it provides Telnet terminal emulation over TCP/IP networks, supporting both TTY, DEC VT102/240, Tektronix 4014, and IBM 3270 terminal types. The program also includes a nice, easy-to-use interface for File Transfer Protocol (FTP) file transfers that resembles the Font/DA Mover interface.

TCP/Connect II, however, includes significant new TCP/IP services. Using Post Office Protocol (POP) and Simple Mail Transfer Protocol (SMTP), a Mac user can send and receive electronic mail over TCP/IP. You can also read, browse, and post messages to Netnews (network news systems) using Network News Transport Protocol (NNTP). Another noteworthy feature is TCP/Connect II's support for Simple Network Management Protocol (SNMP) and Serial Line Internet Protocol (SLIP); the latter protocol allows TCP/Connect II users to take full advantage of TCP/IP networks over serial lines.

All of these features are included in what Intercon Systems calls the extended version of TCP/Connect II. If you don't need all of these options, though, you can buy a basic version of TCP/Connect II for $195, which includes Telnet emulation with VT102 emulation and FTP file transfers. Other versions with different options are available on a mix-and-match basis. The VT240 Telnet version sells for $295, as does the basic version along with SLIP and SNMP support. For this review I tested the extended version.

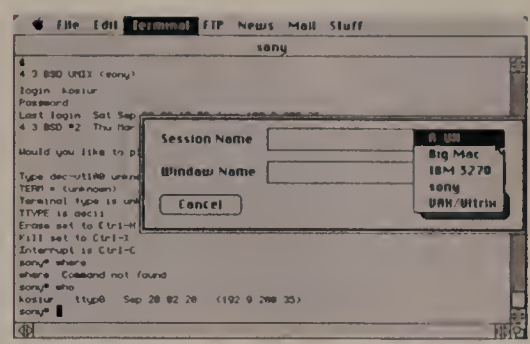
Setting a Configuration

TCP/IP networking is a bit different from AppleTalk networking, since you must assign a static IP address to your workstation. AppleTalk transparently queries the network and assigns a different address to the workstation each time you restart the Mac. TCP/Connect II can be used with either its own version of TCP/IP for the Mac or Apple's MacTCP.

After you assign an IP address to your workstation, all other configuration setup is done within a TCP/Connect II window that resembles an overgrown Control Panel. For example, the extended version of TCP/Connect II includes the following configuration subjects, represented by icons: General, Network, File Transfer (for FTP), Hosts, DEC VTxxx, Tektronix, IBM 327x, Sessions, Mail, News, Serial Port (for SLIP), Printing, and Users (see "Overgrown Control Panel?"). Fortunately, you only have to set up the configuration once. You just save it as a Settings File and you don't have to worry about the configuration again.

The Hosts configuration option is both a good and a bad point in TCP/Connect II. First, the good: after you've added a list of host computers and their IP addresses in the Configuration window, the list appears in a pop-up menu when you want to define a session to connect to a host. The pop-up menu simplifies the connection process. Now the bad—if you already have access to a list of host computers, you can't import that list directly into TCP/Connect II to save time.

Overgrown Control Panel? TCP/Connect II's Configuration window is a larger version of the Mac's Control Panel. Here is the panel of options for the File Transfer feature, which uses the FTP protocol.



Calling In The Connect option on the Terminal menu is used to start a Telnet session. You can enter the IP address or name of the desired host directly into the window or select a session name from the pop-up menu.

FTPing Along This interface should be familiar to anyone who's installed a DA or font on the Mac. In this case, the two boxes display lists of files, one on the host computer, the other on your Mac.

Communicating

Once the configuration is set, using TCP/Connect II is much like using any other terminal emulator except that you're doing everything over a network rather than a modem. You select the Connect command from the Terminal menu and select the desired session (defined for each host) from a pop-up menu. If you want to enter a

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Manufacturer's Reps Inquiries Welcome

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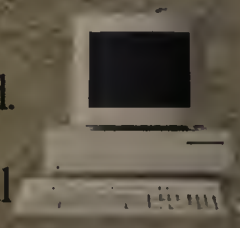

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Please circle 135 on reader service card.

different host that's not in the pop-up menu, you can type it into the Connect command window provided (see "Calling In"). From then on, the connection's automatic. If you defined terminal types, and so on in the Configuration options, the log on to the host will follow those settings.

If you want to exchange files with the host computer, you use the FTP protocol over TCP/IP. TCP/Connect II makes file transfers very easy. TCP/Connect II has a Font/DA Mover–like window with the host's directory files in one box, and your directories (folders) in a second box (see "FTPing Along"). You simply select the file you want to copy, select its destination folder, and click on the Copy button. TCP/Connect II takes care of ASCII and binary file translations during the transfer.

TCP/Connect II's FTP support enables the Macintosh to act as an FTP server in the background, which means that users with the proper password on other TCP/IP-networked workstations can request files from your Macintosh.

Changes

Some users have found that version 1.0 has problems with Netnews browsing and occasionally fails in the presence of certain INITs. I've not experienced the INIT problem, even though I routinely run about three dozen INITs and cdevs on my Mac II (my system heap is set to be larger than normal). The Netnews problem has been rather widespread, however, and according to Intercon, version 1.1 of TCP/Connect II will fix it. According to the company, version 1.1 will also add resizable-window support for the IBM 3270 emulation.

Many of the standard features of Telnet emulations, including IBM 3270 emulation, can be found in public-domain programs offered by various universities on the Internet. However, features such as the news and mail interfaces, as well as SLIP support, are unique to TCP/Connect II. With TCP/Connect II, you get the advantage of company support. All this makes TCP/Connect II the front-runner in providing terminal-based TCP/IP services to the Mac.—**Dave Kosiur**

See Where to Buy or circle 771 on reader service card.

Seven Integrated DAs

DESK 1.0

Pros: Each DA a complete application; excellent online help; good documentation. **Cons:** Lacks macros in spreadsheet, database, and communications components. **Company:** Zedcor. **Requires:** Mac Plus; hard drive recommended. **List price:** $399.95.

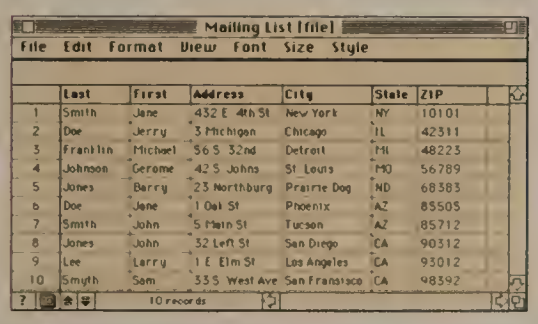
Zedcor's Desk is integrated software, but not in the way you might think. Instead of being a set of programs that interact with one another—like Microsoft Works—Desk is a set of seven desk accessories that are designed to be used with other programs.

Desk includes DeskCalc, a spreadsheet; DeskWrite, a word processor; DeskFile, a database; DeskCom, a communications program; DeskPaint and DeskDraw, two graphics programs; and DeskSecretary, an articulate alarm clock.

Because Desk's applications are DAs, even users with only 1 megabyte of RAM can get MultiFinder-like multitasking by running one or more of the DAs simultaneously with a regular program.

A few features found in top-of-the-line applications are missing from Desk. But Desk was never designed to replace these applications in the first place. Rather, it targets the 80 percent of users who utilize only 20 percent of the functions found in an expensive, top-of-the-line program.

If you own a first-class word processor, spreadsheet, or database program and would like to dabble in other types of applications, Desk could be a good way to start. If you already own many of the application types included in Desk, though, the desk accessories won't provide you with anything you don't already have.



	Last	First	Address	City	State	ZIP
1	Smith	Jane	432 E 4th St	New York	NY	10101
2	Doe	Jerry	3 Michigan	Chicago	IL	42311
3	Franklin	Michael	56 S 32nd	Detroit	MI	48223
4	Johnson	Gerome	42 S Johns	St Louis	MO	56789
5	Jones	Barry	23 Northburg	Prairie Dog	ND	68383
6	Doe	Jane	1 Oak St	Phoenix	AZ	85505
7	Smith	John	5 Main St	Tucson	AZ	85712
8	Jones	John	32 Left St	San Diego	CA	90312
9	Lee	Larry	1 E Elm St	Los Angeles	CA	93012
10	Smyth	Sam	335 West Ave	San Fransisco	CA	98392

DeskFile List View In the List View, data is displayed in rows and columns, formatted for quick viewing. The question mark icon at the bottom left opens up the Help file, the Form icon toggles you into the Form View, and the arrows take you to the next and previous records.

DeskCalc

DeskCalc sports the standard column-row interface of other spreadsheets such as Excel, Wingz, and Microsoft Works. And like those spreadsheets, DeskCalc offers a variety of charting options; control over the format, font, size, and color of cell contents; and a slew of functions.

However, DeskCalc has 47 functions, compared to Works' 64. DeskCalc has none of Works' statistical and scientific functions and only a few of its financial ones. One function Desk has that Works doesn't is Chart.

DeskCalc offers six chart types. Charts are generated right on the spreadsheet—unlike in Works, which creates separate files for charts. The primary advantage to having the chart on the same screen as the spreadsheet is that changes made to the spreadsheet data are instantly reflected on the chart. One major thing that DeskCalc lacks, however, is built-in macro or scripting capabilities.

DeskWrite

While DeskWrite lacks some useful word processing functions (style sheets, table of contents, outlining), it is adequate for producing a business letter, short document, or even a newsletter.

One of DeskWrite's most useful features is a Statistics function that gives the number of pages, paragraphs, sentences, words, characters, and pictures in a document, as well as the document's size in kilobytes, the average number of words per sentence (a godsend for any journalist), and the average number of characters per word. Even for relatively large documents, Statistics reports all this data almost instantaneously.

Another fine feature is the Page Layout dialog box, which allows you to set top, bottom, left, and right margins either numerically by entering inches or graphically by clicking and dragging the margins. Changes

(continues)

appear instantly.

DeskWrite also has Stationery Layers, layers of information that can be printed at the top or bottom of a page, much like headers and footers. But unlike with headers and footers, the alignment of Stationery Layers can be set to alternate left and right for facing pages, such as those found in a book or newsletter.

DeskWrite's Print Page to Clipboard function allows you to copy any page in a document to the Clipboard for quick and easy pasting to another application.

DeskWrite also has some desktop publishing features, including the ability to draw paragraph borders in four patterns, five colors, and nine line widths. DeskWrite also has a Text Wrap command for graphics, which allows you to specify that words wrap around the left or right side of a graphic, that the graphic stays in between lines of text, or that the graphic lies in front of text.

DeskFile

DeskFile has most of the functions you'd expect to find in a database but—like DeskCalc—lacks any macro or scripting capabilities.

DeskFile lets you format records as labels, forms, or lists. Labels can be customized for printing in Page Setup, and forms can be customized using the Edit Form command. DeskFile's mail-merge function works with DeskWrite and other word processors.

The Edit Form command is one of Desk's most outstanding features, enabling you to move forms to the Desk's draw DA, DeskDraw, for a high degree of customization. You can, for example, modify the size and position of a field and add text and objects such as boxes and lines.

DeskFile Form View The DeskFile DA allows you to set up simple flat-file databases for such applications as mailing and address lists. In the Form View shown here, the data is displayed one record at a time.

In addition to short text fields and numeric fields, DeskFile also provides long text fields capable of holding up to 32,000 characters, and picture fields for pasted-in graphics.

DeskCom

DeskCom is an easy-to-use communications program. The included Phonebook allows you to pair phone numbers of services or other computers with custom configurations for baud rate, data bits, stop bits, port, handshake, and dial method. DeskCom places Phonebook names in the Connect menu, enabling you in one step to dial a number using the custom settings you configured.

With DeskCom, it's possible to create a document in an application and send it out via modem without quitting the application and opening a communications program.

DeskSecretary

DeskSecretary is essentially an alarm clock that can break into any application and give you a preset reminder. Reminders appear on the screen and flash a message that you set previously.

You can set one-time-only reminders, or repetitive reminders for events that recur daily, weekly, monthly, or annually. You can even set DeskSecretary to remind you in one of three voices: a secretary (female or male) who politely intones "excuse me" or a bloodcurdling scream.

DeskDraw and DeskPaint

DeskDraw and DeskPaint, previously released by Zedcor, are full of functions and support 24-bit color. DeskPaint has many fine features like Free Rotate, Auto Trace, and Scaling. DeskDraw sports a Smooth function, Scale to Percent, and six shape tools (for a review of DeskPaint 2.01C and DeskDraw 1.3, see *Reviews*, May 1990).

Help

All of Desk's DAs come with excellent online help complete with illustrations and examples. Documentation includes an instructive tutorial and a comprehensive reference manual.

Because Desk lacks many features, it is not all things to all people. However, if you who want to try to use different applications and don't want or need all of those functions, Desk could be your cup of tea.

—Jonathan Cassell

See Where to Buy or circle 726 on reader service card.

Hard Drive Utilities

MACTOOLS DELUXE

Pros: All-in-one convenience; fast back-up; new drive-partitioning utility. **Cons:** Optimizer program slower than in previous version; limited support for the IIfx; many utilities still need minor cleanup. **Company:** Central Point Software. **Requires:** Mac Plus. Hard drive recommended. **List price:** $129.

MacTools Deluxe is a collection of Macintosh hard-drive and file-management utilities that is a revised and enhanced version of Central Point Software's PC Tools Deluxe for the Macintosh.

Since Central Point wanted to make its utilities simple enough for any Macintosh user, the company included an installer that copies the MacTools files to a selected drive-and-folder combination. But since the installer doesn't do any actual configuration work, it's just as easy to drag the files to a hard drive via the Finder. In fact, if the folder you'll be using happens to be the last one alphabetically on the drive, copying via the Finder is the only way you can install MacTools because the file dialog box for Installer never lists the last folder in a directory.

Although you'll seldom want to run several MacTools utilities in a row—unless you're having serious drive problems—the included Launcher program lets you run any of the tools from a common window. You can also add application icons, like Excel and MacPaint, to the Launcher window and use it to start them up as well. When you quit from an application started with Launcher, however, you don't necessarily return to Launcher. Only the MacTools utilities or programs with a Launch menu option will be able to return directly to Launcher, rather than going to the Finder.

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Requirements for Mac version of CompuServe: Mac Plus or later model Macintosh with at least one megabyte of RAM. Mac System 6 or later version: hard disk, one 800K (or higher) floppy drive. Hayes compatible modem recommended.

*Suggested retail price.

Circle 371 on reader service card

"LISTEN, MAC, YA GOT THREE CHOICES..."

LaserMAX 1000 Personal Typesetter

The LaserMAX 1000 utilizes the same *resolutionary* TurboRes™ technology to produce incredible 1000 x 1000 TurboRes™ output.

TurboRes™ resolution enhancement technology controls the position and height of the pixels on the printed page and eliminates coarse steps between pixels, otherwise known as *jaggies*. With output this sharp, you won't need to send out for expensive and time-consuming typeset output.

And, both the LaserMAX 1200 and the LaserMAX 1000 come *standard* with the LaserMAX 135 Typeface Classics—135 premium typefaces in Type 1 format.

LaserMAX 400 Personal Printer

Who said quality doesn't come cheap? The LaserMAX 400 provides Macintosh users with 400 x 400 TurboRes™ output, 50 premium typefaces in Type 1 format and *still* sells for less than $2,000. That's a bargain any way you look at it.

The LaserMAX 400 is a powerful PostScript-language compatible laser printer that works with many of your desktop publishing and graphics applications. The 4-page-per-minute printer is based on the same LBP-LX print engine that's used with other personal printers, including Apple's new Personal LaserWriter 5C and NT and HP's LaserJet IIP.

LaserMAX 1200 Personal Typesetter II

You knew it was only a matter of time before LaserMAX gave you more. With the introduction of the LaserMAX 1200, Macintosh users are given far more publishing power than ever: 1200 x 1200 TurboRes™ output in an 11 x 17-inch format.

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Circle 342 on reader service card

Drive Optimization

The optimization program in PC Tools Deluxe could only unfragment files by taking those that had been split across the drive and piecing them back together into contiguous chunks. The new version goes much further, and includes an option for physically reorganizing the hard drive, placing applications at the front (since they're less likely to be modified), and following them with documents (see "Optimizer"). You also can choose an optimization that places applications and documents on both the front and back of the drive, leaving the free space in the middle. Or you can use Optimizer to check for bad blocks or make free space unreadable.

Although more advanced, the new Optimizer is also slower. Even reoptimizing a drive that, according to the utility, had 0.00 percent fragmentation took 13 minutes. You should note, too, that the time estimates given by the program can be overly optimistic. In two tests, an operation with a 1-minute estimate took 4 minutes to complete, and 8 minutes became 13. Nevertheless, if a drive has become seriously fragmented, an occasional cleanup with Optimizer should be worth the time spent.

Backup

No hard drive utility package would be complete without a backup program. Backup enables you to do full or incremental backups to floppies, Apple-compatible tape drives, or Syquest-type removable media. The program is easy to use and fast—even with its compression option in effect. As a test, I did a selective backup of 2.9MB of data and applications using Backup and FastBack II (both from Fifth Generation Systems). Surprisingly, Backup was faster than FastBack (110 seconds versus 147 seconds), and even used less space to store the data (1941K versus 2082K).

Data Protection and Recovery

Several MacTools Deluxe utilities are devoted to protecting data from inadvertent destruction and providing ways to recover data if necessary. The main protection tool is Mirror, a combination INIT and Control Panel device. Once installed and activated, Mirror

Optimizer As you add new files, modify old ones, and throw some into the Trash, the data on your hard drive becomes progressively more fragmented—which can increase drive access times dramatically. The graphical map here shows a hard drive after it has been fully optimized.

creates and automatically updates three invisible files that keep track of critical volume information and the names and locations of all files that have been thrown in the Trash. Options allow Mirror to run automatically at specified time intervals, to be invoked by a hot key, and/or to run whenever you choose Shut Down from the Finder.

If Mirror has been installed, the Rescue utility can reconstruct a hard drive that has corrupted directory or volume information, or one that was accidentally initialized. There are also several methods for undeleting files. But there's no guarantee that files that Rescue—or any other utility—reports as having been successfully restored are, in fact, intact. Essentially, once a file has been deleted, the System marks the file's space as available and, as you add new files and update existing ones, part of the space may be used by another file, overwriting your previous work.

The Secure program and DA enable you to encrypt, compress, and hide data files or programs. Both fast encrypt and a DES version are provided. Depending on the file type, using the compression option can reduce file size by 25 percent to 60 percent. The Locate DA is an advanced version of Apple's Find File accessory that lets you search for files by file name or by keywords included in the file. The contents of found files can be displayed on screen, and the files can be moved to the desktop or the associated application can be launched—all without returning to the Finder. You can also copy information from within one or more found files and paste it into any application.

The FastCopy program allows you to make multiple copies of floppies, or format a stack of disks, without going through all the swaps and the annoying prompts that the Finder imposes. There's also a sophisticated track editor within the program for detailed examination of disk sectors.

The Partition DA is designed to split a hard drive into smaller segments, each of which acts as a separately mountable hard drive. This is especially handy for making large drives more manageable and for setting up multiuser systems. When creating a partition, you can specify the initial partition size, as well as how large it will be allowed to grow as additional space is needed. Partitions can be set to mount automatically at start-up, to be read only, or to be encrypted.

Finally, there's FileEdit, a file-examination program that's been around since Copy II Mac (Central Point's earlier Mac utilities program). FileEdit lets you see all the files on any mounted drive—including ones that are invisible from the desktop. It's a handy utility for anyone who likes to occasionally check and see what new files are being mysteriously added to a drive. Files can be deleted or verified from within the program, and can even be shown in a pretty tree display.

Not Bug Free

After reviewing dozens of hard drive utilities over the years, I've never seen one that was bug-free. MacTools Deluxe is no exception. Although it offers an impressive assortment of utilities, it's obvious that it has some gotchas, most of which will probably be corrected by press time. Still, if you understand the limitations and don't already have a significant number of these utilities as stand-alone programs, MacTools Deluxe offers a way to get just about everything you need in one package. And what you don't need, you don't have to use.

—Steven A. Schwartz

See Where to Buy or circle 744 on reader service card

An Overview of United States History

POINT OF VIEW

Pros: Interactive hypermedia approach facilitates individual exploration of historical relationships. **Cons:** Database has limitations and omissions; user interface is not completely intuitive. **Company:** Scholastic. **Requires:** Mac Plus; hard drive. Pioneer videodisc player optional. **List price:** $249.95.

As the venerable Apple II inches toward retirement, more and more educational software publishers are turning their attention to the Macintosh. Scholastic, one of the largest educational publishers in the country, recently released an ambitious program for the Mac that many educators believe may significantly change the way students study history. Planned as a three-title set, Point of View will include An Overview of United States History (reviewed here), The Civil War and Reconstruction, and 1492: A Meeting of Cultures.

Point of View is a "history processor" that enables middle- and high-school students and teachers to do research projects and presentations by tapping into a massive historical database. An Overview of United States History includes more than 2000 pages of historical documents and 140 data tables from the U.S. Census Bureau. Point of View links these documents and tables so they can be explored and displayed in a number of thought-provoking combinations.

Pointing to the Past

Point of View allows you to view data in a variety of ways. One, for example, is a time line with icons representing historical milestones in categories such as Presidency, Arts, Native Americans, Intellectual Life, Inventions, and War. Clicking on an icon reveals a brief description of the milestone.

You can also control the time period by scrolling through the time line or by changing the time intervals displayed. Sometimes zooming in on shorter time periods reveals additional milestones. As with any overview, you may at times wonder how milestones were chosen for inclusion. (Is it significant that Groucho and Elvis died in the same year?)

Chart views let you display line charts, column charts, or tables showing numerical relationships of historic data. Map views can show how the data looks on a regional or national map. You might create a map showing, say, voter turnout in each state in the 1900 presidential election.

Maps and charts are dynamic, so you can see them change as you scroll forward or backward on the time line. Or, you could grab the top of a bar chart showing, say, the number of telephones in American homes and stretch it up or down; the program responds by moving to the point in time when the data most closely matches the height of the bar.

To make it easier to locate specific views or milestones, Point of View has a Find View, which works like a word processor's Find command. The Open View command lets you open any view on your disk, including (digitized) Sound views and, if your computer is attached to an appropriately equipped videodisc player and a TV, historically relevant videos.

Making Your Point

Point of View also contains features that facilitate authoring and presentations. You might, for example, use Point of View to document the history of your community or state. You can create your own views and, if you like, build a dynamic presentation showing historic highlights.

Essay View is a no-frills word processor for editing text and associating it with a date. Document View lets you create source documents, complete with pictures. Picture View allows you to incorporate imported pictures. All three of these views change as you move through time; a section editor lets you link particular parts of a document to a given time.

View upon View Point of View's maps and charts change dynamically as you scroll through history.

Point of View allows you to enter new data for charts and graphs; it's just as easy to import data from other Mac applications. You can add milestones; there's even an icon editor for creating new milestone icons. Special Effects views allow you to access videodiscs, digitized sounds, autoscrolling time lines, and slide-show-type presentations. Finally, it's possible to link just about anything to something else, allowing for the possibility of true hypermedia documents.

What's the Point?

I examined this program in the company of a history hobbyist and a high-school history teacher. We all were impressed by it's potential, but we had several misgivings. Unlike similar HyperCard-based programs, Point of View requires you to spend some time with the manual before you can take full advantage of the program's multitude of unusual features. (Who would guess, for example, that dragging a milestone icon into a text window would display the descriptive text for that milestone?) Even with the manual, we found that some features didn't work as advertised. A presentation designed to give an overview of Point of View's features, didn't work properly on several of our machines.

The historical database is far from exhaustive. Several data sets had gaping holes; others stopped too soon. Why, for example, does the data on electoral college votes stop in 1968?

The lesson plans and teaching suggestions included were not as helpful as they could have been. Like the rest of the manual, they looked as if they were put together a little too quickly.

Pointing to the Future?

Is Point of View the way to go? In its current form, the American history overview has several problems. But it also has great potential to enrich the study of history. Point of View won't take the place of textbooks—it's not designed to. As a tool for independent study and exploration, though, it has a lot to offer.—**George Beekman**

See **Where to Buy** *or circle 754 on reader service card*

WINDOW SHOPPING

by Lawrence Stevens

This month I look at two programs for teachers, a hurricane-tracking program, an example of computer fiction, a HyperCard scripting program, and two software packages for writing reports and agreements

RON CHAN

Ask It 1.0

Creating tests can be one of the most important and onerous jobs that teachers have to do. As a result, most educators who use computers quickly develop a strategy for automating the test-making process.

MakeTest from Mountain Lake Software (reviewed here last September) gives you a point-and-click method of selecting questions, and StudyMate from Compu-Teach (reviewed here last October) provides an easy way to create HyperCard-based on-screen tests. Ask It ($99.95 from True Basic) enables you to create both printed and on-screen tests.

Ask It has more options than StudyMate does for interacting with the test taker. For example, you can let students retry a question they get wrong, you can include a hint for each question, and you can enter individual comments for each multiple-choice response. After each student completes an on-screen test, the program can print a hard copy of the questions the student answered incorrectly along with a list of suggested readings. The teacher can also view a report showing each student's test score.

Both Ask It and MakeTest provide searching techniques for finding test questions. But Ask It allows Boolean logic in formulating searches.

Ask It has a number of drawbacks. The most serious is that you are limited to multiple-choice and true-false questions. MakeTest and StudyMate include essay and fill-in questions. MakeTest also allows you to paste graphics into a test and specify the font style and size—neither is possible with Ask It. StudyMate's primary advantage over Ask It is that it includes features such as automatic scrambling of spelling words.

In general, Ask It is a better buy. If you use only on-screen exams, I recommend Ask It over StudyMate, since Ask It allows you more interaction with the students. For hard-copy exams, I recommend MakeTest because you can format text and include graphics. I think Ask It's searching capabilities give it the advantage over MakeTest and StudyMate—if you can live with the formatting limitations.

The Mathematics Teacher's Workstation 1.0

The Mathematics Teacher's Workstation ($149.95 from Sterling Swift Software) enables math teachers to display algebraic, trigonometric, or geometric functions and has a number of tools for creating instructional programs for students. The most powerful features are the Graphing and Geometry modules. The Geometry module has ten tools for drawing geometric shapes. The Graphing module lets you type numbers representing algebraic or trigonometric equations, and the program automatically plots a chart of the equation on the x- and y-axes.

After you've created a series of screens, you can link them to create a tutorial. Students view the tutorial by moving from screen to screen with mouse clicks. As an option, you can specify that elements will be drawn in the order in which you drew them.

The program also includes Grade Book and Address modules. But both of these modules have serious limitations. The Grade Book module is slow and doesn't calculate grade averages. The Address module is limited to a maximum of 100 addresses.

The Mathematics Teacher's Workstation's primary problem is that it's not very forgiving. Once a student begins a tutorial, there is no way to abort the tutorial short of quitting the application. The 12-page manual is also much too skimpy.

I can recommend this program only if you are willing to figure out how the program works without the benefit of good documentation.

TrakHur 1.5

TrakHur ($39.95 from Hurricane Research Service) helps you view the direction a storm takes over a period of time. You type in data such as wind speed and direction, air pressure, and storm location at different time periods. The program then displays a map showing the movement of the storm (see "Tracking a Storm").

The map is clear and attractive, and data input is easy. The program, however, suffers in its conversion from MS-DOS. You have to append DOS-like suffixes such as .HUR to file

(continues)

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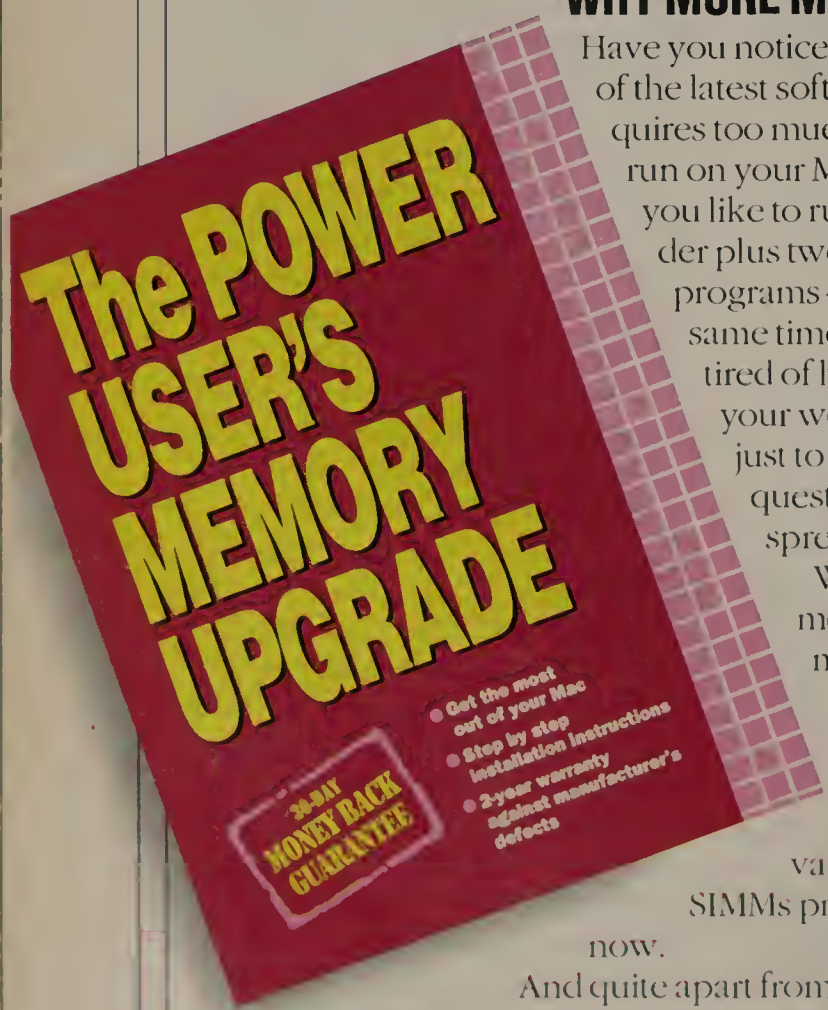
And quite apart from the ability to do multi-tasking, added memory speeds up your disk access time and eliminates delay when selecting menu items.



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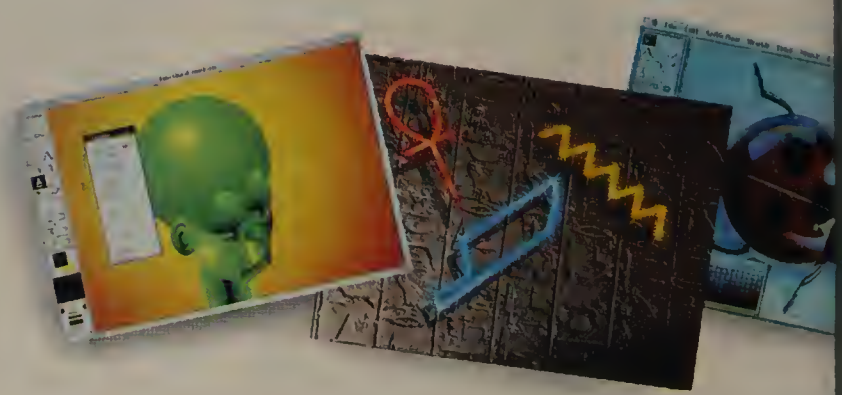
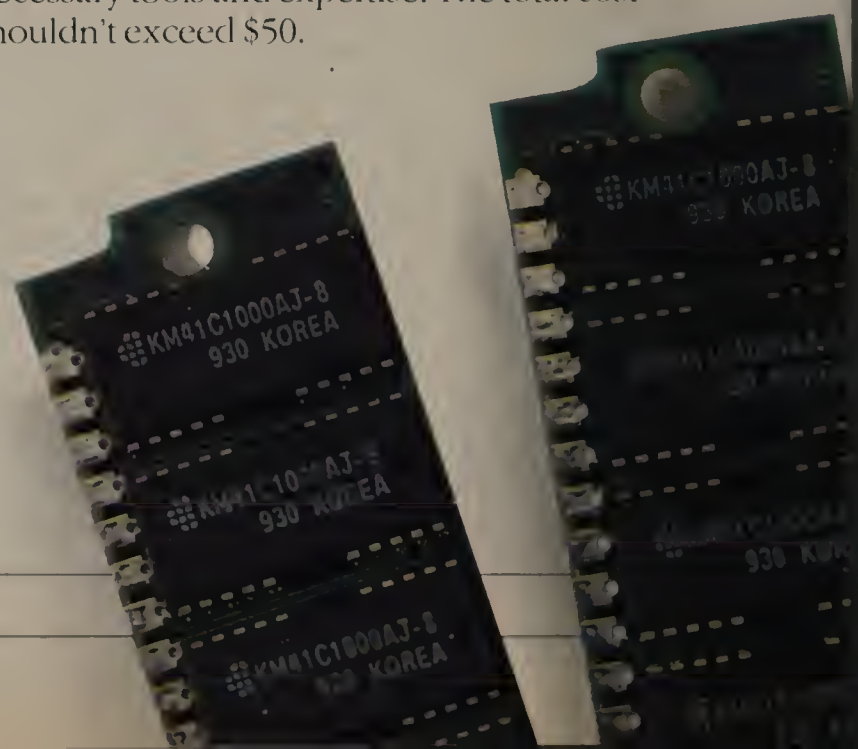


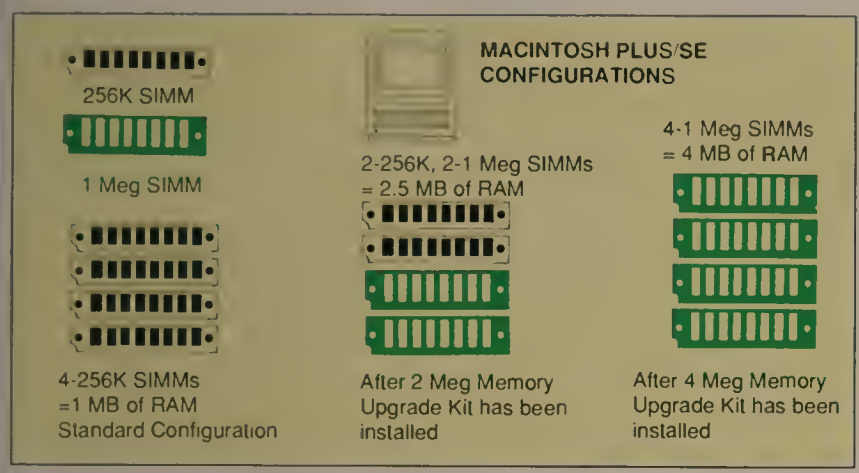
the process being done step-by-step. The video is free with the purchase of 2 or more SIMMs modules. ($29 if purchased separately.) The whole job should be completed in less than one hour. You'll need a simple tool kit, which is available for just $9.

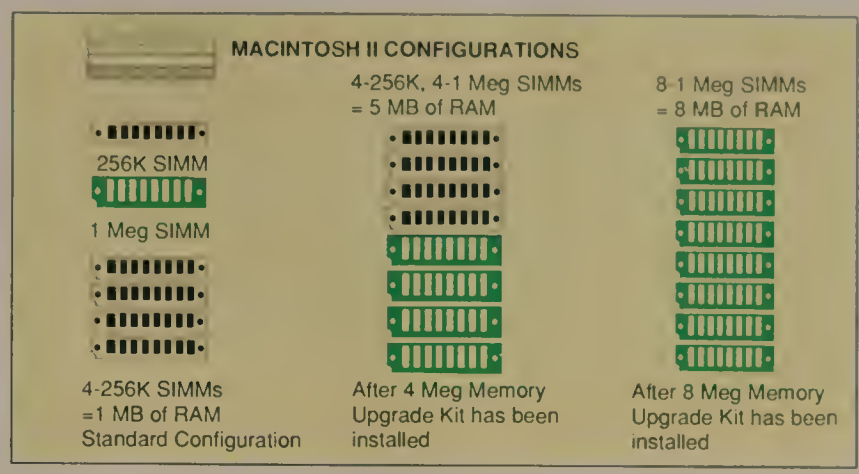
If you prefer, you can have a computer store install your SIMMs for you. Their service technicians have the necessary tools and expertise. The total cost shouldn't exceed $50.



The Mac Plus and Mac SE have four available slots on the motherboard, which originally contain four 256K SIMMs modules — totalling 1 megabyte (1MB) of memory. To upgrade, you can replace each 256K module with a 1MB module, but you must do this in pairs.

Replace two 256K modules and you will have a total of 2.5MB of memory. (That's the two new 1MB modules plus the original two 256K modules.) Replace all four modules and you'll have 4MB. (You should save the 256K modules for later use if you want to pass your Mac on to someone else.)





The Mac II, IIx, IIcx and SE/30 each come with a total of eight slots. The standard configuration has four 256K SIMMs modules, or a total of 1MB. Here, memory must be upgraded in multiples of four. This allows for expansion from 1MB to 4MB, 5MB or 8MB.

Remove the four 256K modules and replace with 1MB modules and you have 4MB. Leave the original modules and add four 1MB modules and you get 5MB. Removing the original modules and adding eight new 1 MB modules will bring you to 8MB of memory.

FAST, FASTER, FASTEST

SIMMs come in different speeds and are calibrated in nanoseconds (ns) from 70ns to 120ns. Anything faster than 120ns doesn't much help any Mac but the IIci. The system doesn't respond any faster anyway. But you can always take your memory chips with you when you move on to a new Mac, so there may be an advantage to speed at a later date.

QUALITY CONTROL

MacWarehouse buyers and agents scour the world in search of top quality components for our SIMMs modules. They're supplied only by top grade manufacturers like Samsung, Siemens, Texas Instruments, Micron, Fujitsu, Intel, etc. Each unit is tested for performance, quality and noise, in temperatures from freezing to 158°F.

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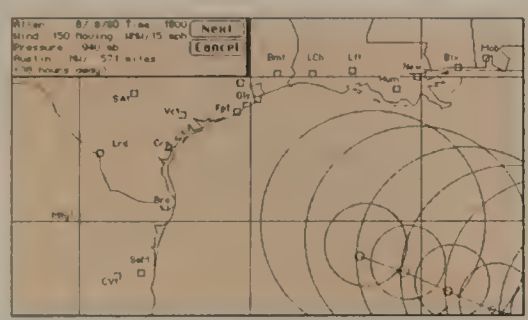
Circle 78 on reader service card

names; some menu items simply do not work, even though they are not grayed; there are no keyboard shortcuts; and the program doesn't work under MultiFinder. I would like to look at TrakHur again after it gets its Mac act together.

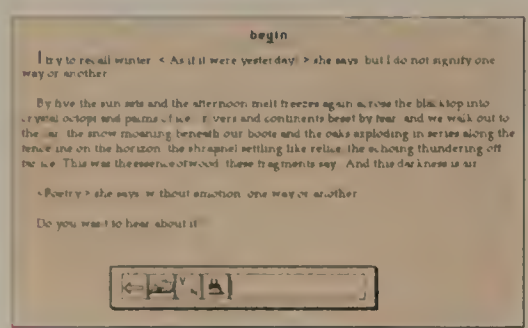
Afternoon, a story

Afternoon, a story ($19.95 from Eastgate Systems) is, in my opinion, the first true example of computer fiction. Up till now, so-called computer fiction had little to do with prose and a lot to do with graphics, sound effects, and puzzle solving.

Afternoon, a story has no pictures, sound, or game points. But it is interactive. For example, characters often ask if you want to hear about a certain event or inner thought. Your response determines the next screen you see. Also, clicking on certain words on each screen (the words are not indicated—you have to guess) takes you to other screens that relate to those words. It is as if you are having a series of meandering conversations with the characters. This is a lyrical, poetic, stream-of-consciousness type of novel—not the action fare normally found in computer fiction. If this is your cup of tea, Afternoon, a story can provide a wonderful new experience.



Tracking a Storm As the box in the upper left indicates, the storm is 38 hours from the coast. Clicking on the Next button moves the storm forward in time by six hours.



Afternoon, a story Clicking on the open book button allows you to select screens to view. The Y/N button allows you to respond to a character's question.

HyperSnoop 1.0

When I took programming in college, the emphasis was on the structured approach. Our programs not only had to work, they also had to make clear what each section of the program did, so that anyone could make changes. Then came HyperCard, and all the rules changed. Code is no longer listed in neat lines but is scattered among cards, buttons, and fields. There is no way to scan an entire script.

HyperSnoop ($28 from SPE Software) extracts all the scripts from any or all the elements of a stack, and lists the code either in text form to be read by a word processor or in a HyperSnoop stack (see "Analyzing a Stack"). To alter a script, you select it in the HyperSnoop stack, and the program takes you to the card, button, or field in the original stack where the script is located. This reasonably priced program provides the best way to view, organize, and store scripts. It is practically a must for the HyperCard scripter.

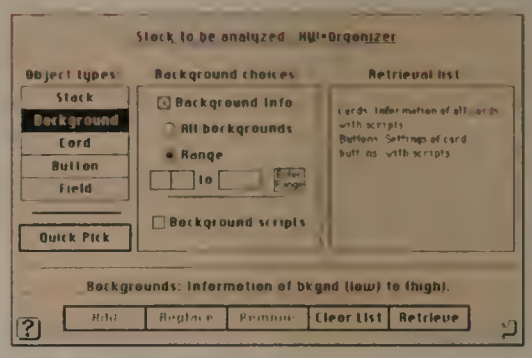
Report Ideas

Report Ideas ($79 from Intelligence Active Software) is a DA that helps you use standard phrases when writing professional reports, a genre that emphasizes conventional rather then creative prose. Report Ideas contains 70,000 phrases typically used in professional papers. You locate the phrases through a series of menus and submenus arranged by category. Once you find a phrase, you can have Report Ideas suggest alternatives for many of the words.

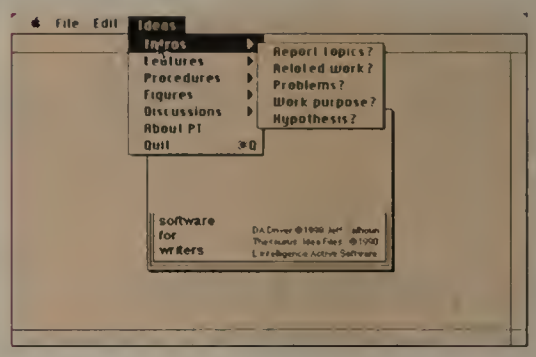
The program comes with an excellent 41-page manual, with only one page on how to use the software, and the remaining pages teaching basic report writing. Intelligence Active Software's previous product, Phrase Thesaurus Report Rad, which I reviewed in December of 1989 and which is still available, does the same thing as Report Ideas but is a less-convenient HyperCard stack and contains only 3000 phrases. The current product is a far better buy.

AgreeMentor

AgreeMentor ($99 from Jian) provides 21 business agreements on disk. This eclectic set includes agreements



Analyzing a Stack HyperSnoop can analyze either an entire HyperCard stack or selected elements of the stack.



Report Ideas Most reports begin by selecting Intros. First you select a phrase from Report topics, then Related work, and so on. Once you've completed the introduction, you're ready to begin a discussion of the features of your topic. After Features, you work on Procedures, Figures, and Discussions, after which the paper should be basically completed.

for manufacturer's representatives, equipment leases, independent contractors, and sales representatives, and business consultants. Most office-supply stores sell similar legal forms in paper fill-in-the-blank format for about $10 each. The advantage of having the forms on disk is that you can easily customize the agreement. Contracts also look more professional when printed on a laser printer.

Possibly to avoid liability problems, Jian advises that you have an attorney review each agreement you create with AgreeMentor. I suspect many people can use the forms as is, avoiding legal costs entirely.

My only problem with AgreeMentor is that it contains such a diverse set of agreements that few companies will use more than one or two or them. Still, the price is so reasonable that even if you use only one form each year, it is worth having this set on your hard drive. ☐

See Where to Buy or circle 711 (Afternoon, a story), 712 (AgreeMentor), 716 (Ask It), 739 (HyperSnoop), 745 (The Mathematics Teacher's Workstation), 761 (Report Ideas), 773 (TrakHur) on reader service card

RESTRICTED AREA

Your data is *your* data. And to keep it that way Kensington introduces PassProof™ — the first complete data protection system for the Macintosh®.

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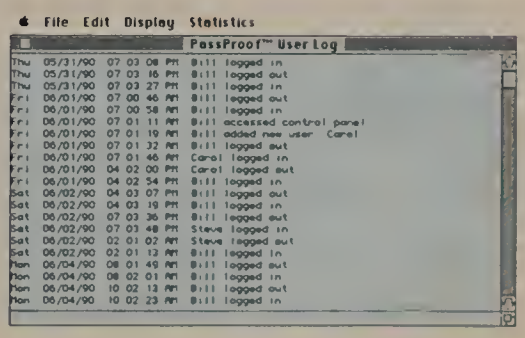

Want to "lock up" in a hurry? Quick Cover™ is PassProof's screen-locking program that lets you secure your Mac on command.

Best of all PassProof is user friendly.

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Ask your dealer about other Kensington accessories including cable and lock systems for all Apple and Macintosh computers, including the Mac Portable and the LaserWriter® II. Or call for a free brochure at 800-535-4242. Outside the U.S., call 212-475-5200.

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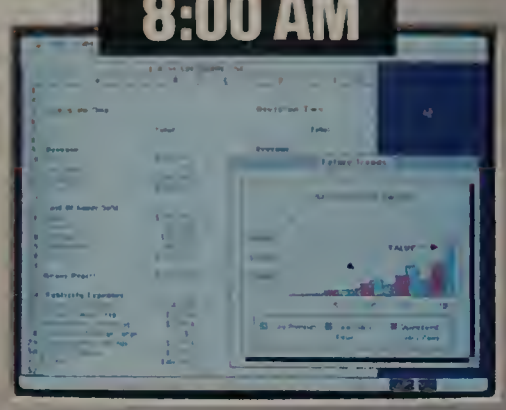
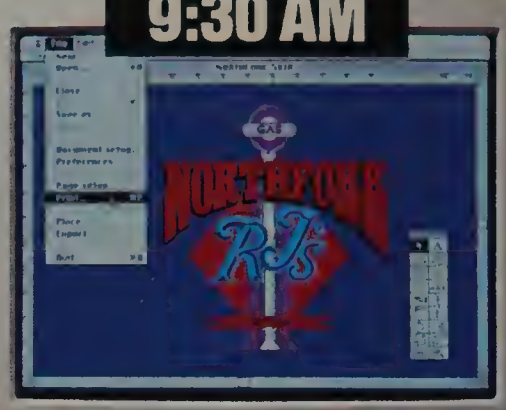
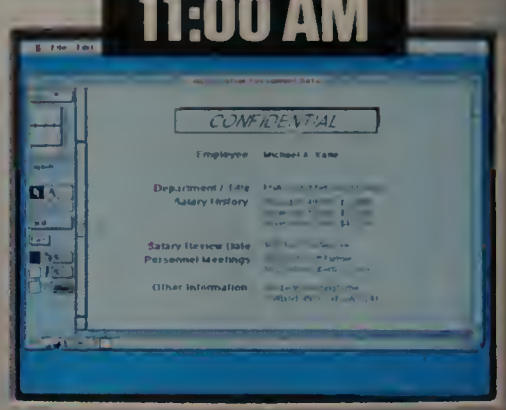
A Day In The Life Of



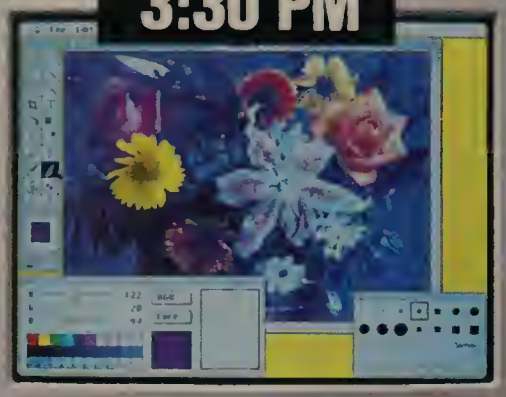
RUNNING SALES FORECASTS



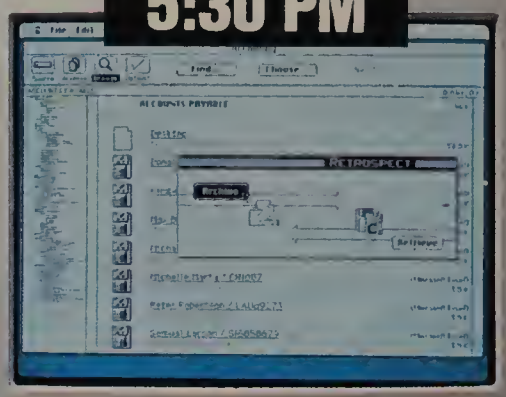
UPDATING CARTRIDGE-BASED GRAPHICS



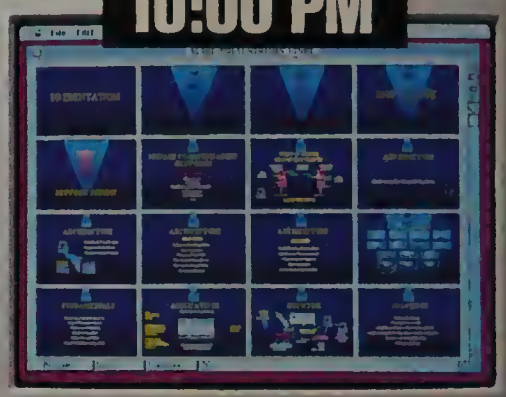
ARCHIVING CONFIDENTIAL RECORDS



REPLACING DOWNED HARD DISK



BACKING UP PAYABLES REPORT

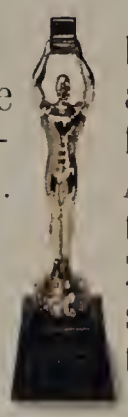


MASTERING FIELD OFFICE SLIDES

MacinStor® Erasable Optical.

Imagine a storage device that runs at near-Winchester speed, has the capacity to accommodate massive databases, and the versatility to do not just one storage task, but a dozen.

The Eddy Award-winning MacinStor Erasable Optical is just such a device. A dynamic storage system that (1) provides infinite near-line storage capacity, (2) is the most reliable and convenient data backup and archiving solution, (3) lets you carry or send massive files, (4) functions perfectly as a primary storage device, (5) gives you lock-it-away data security, and (6) can immediately take over for a downed hard drive without missing a beat.



MacinStor Erasable Optical is multi-talented because it is multi-featured. It's a bootable, random access system that delivers instant access to files. It boasts a 35 ms average seek time. It is AppleShare® and A/UX™ compatible. You get our top-capacity, one gigabyte cartridges, certified for 25-year data life. And the most comprehensive set of utilities software, including Retrospect,® the Eddy Award-winner for backup.

Day or night, as a great tool for productivity and a great device for data protection, MacinStor Erasable Optical is a very timely choice. For more information, call (408) 879-0300. Storage Dimensions, 2145 Hamilton Avenue, San Jose CA 95125.

STORAGE DIMENSIONS

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To Be Called Circle 176 on Reader Service Card
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See Us At Macworld San Francisco, Booth #2117

NEW PRODUCTS

Edited by Mary Margaret Lewis

This section covers Macintosh products formally announced but not yet evaluated by Macworld. All prices are suggested retail. Please call vendors for information on availability.

HARDWARE

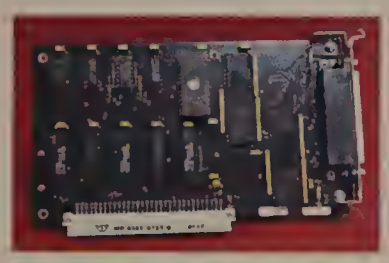
CDR-10 CD-ROM/Audio Player

CD ROM and audio player based on VLSI technology. Offers full audio support, has embedded SCSI interface, and comes with Mirror's custom Remote Control utility software, which controls the audio. Each CD holds up to 600MB of data. Player has access rates of 350 milliseconds. $697. Mirror Technologies, 612/633-4450.

CDR-10 CD-ROM/Audio Player

Digital Interface Board

Digital interface board for the Mac II that enables the user to interface to numerous devices such as printers, plotters, BCD-compatible test equipment, and other computers. Comes with a software driver for the Mac Operating System. $299 bundled with software. Fishcamp Engineering, 805/937-6758.



Digital Interface Board

DiskTwin

NuBus interface board bundled with drive-duplication software. Program automatically creates exact duplicate of the primary hard drive on a secondary drive to enable users to recover data after a primary drive failure without data loss. $995. Golden Triangle, 619/279-2100.

DiskTwin

G9800 Series Plotters

Direct imaging raster plotters with 406-by-406-dpi resolution. Machines produce monochrome output on paper or film at speeds of up to 1 inch per second, automatically cut finished drawings from roll feeder, and are network-compatible. D-size model $20,990; E-size model $23,990. Oce Graphics, 415/964-7900.

Gold Brick

Device that provides three-dimensional input using Apple's recently published standard memory structure for three-dimensional input. Can also serve as a mouse and/or keyboard substitute. Plugs in to the ADB port. Works with a wide variety of controllers, including an eight-button controller that comes with the product. $195. Transfinite Systems Company, 617/969-9570.

Gold Brick

IMG-511 Flatbed Scanner

8-bit full-page gray-scale flatbed scanner that comes with ImageStudio scanning and editing software from Letraset. Supports 256 gray-scale images, has a resolution of 300 dots per inch, and scans gray-scale line art and halftone graphics. $2190. Fora, 408/944-0393, 800/367-3672.

IMG-511 Flatbed Scanner

Intel 9600EX Modem

External, full-duplex 9600-bps modem. Supports the CCITT V.32, V.42, and V.42bis international standards. $819. Intel, 503/629-7354.

Intel 9600EX Modem

Intensify EP6000

Memory upgrades for the Epson EPL-6000 Laser Printer. Designed to enhance the ability of the EPL-6000 to store memory-intensive graphics, macro commands, and multiple downloadable fonts. Intensify EP6000 2MB board $344; 4MB board $479. Micron, 208/383-4000.

Pacific Connect

Printer-sharing device that allows any combination of up to five IBM PCs (or compatibles) or four Macs to be connected to one HP LaserJet series II, IID, III, or IIID. Also provides the ability to connect to a mainframe or minicomputer. $399 for 256K version, $499 for 1.25MB version. Pacific Data Products, 619/552-0889.

PowerScript

Printer-resident controller that uses RISC technology based upon Advanced Mi-

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cro Devices' 29000 microprocessor to produce a more than tenfold increase in the processing speed of LaserWriters. Compatible with Adobe Type 1 fonts. Adds resolution enhancements of 300 by 300, 300 by 600, up to 300 by 1200 dpi. Also provides SCSI hard drive connectivity; AppleTalk, Serial, and Centronics parallel interfaces; and comes with 2MB of RAM. Uses the PhoenixPage PostScript-compatible interpreter developed by Phoenix Technologies. $1695. Xante, 205/990-8189.

PowerScript

QuickVideo Studio Card

QuickVideo Studio Card

Full-motion multimedia business-tool. Board that comes bundled with software. Enables users to create real-time video special effects on the Mac II and later Mac models. Allows on-screen viewing of multiple live video windows from different sources for editing and producing multimedia presentations. NuBus board needs no external hardware and accepts input from RGB, composite, and S-VHS sources in either NTSC or PAL formats. $2495. E-Machines, 503/646-6699.

Softstep III

Memory-upgrade kit that transforms four SIMMs into one larger SIMM using the original SIMM socket on the main logic board. Provides up to 15MB of application RAM and from 14MB to 24MB of RAM using 1MB SIMMs. Comes bundled with Maxima software, which enables the Mac II to use more than 8MB of RAM. Kit of four memory modules bundled with Maxima $199. Computer Care, 612/371-0061.

SOFTWARE

911 Utilities

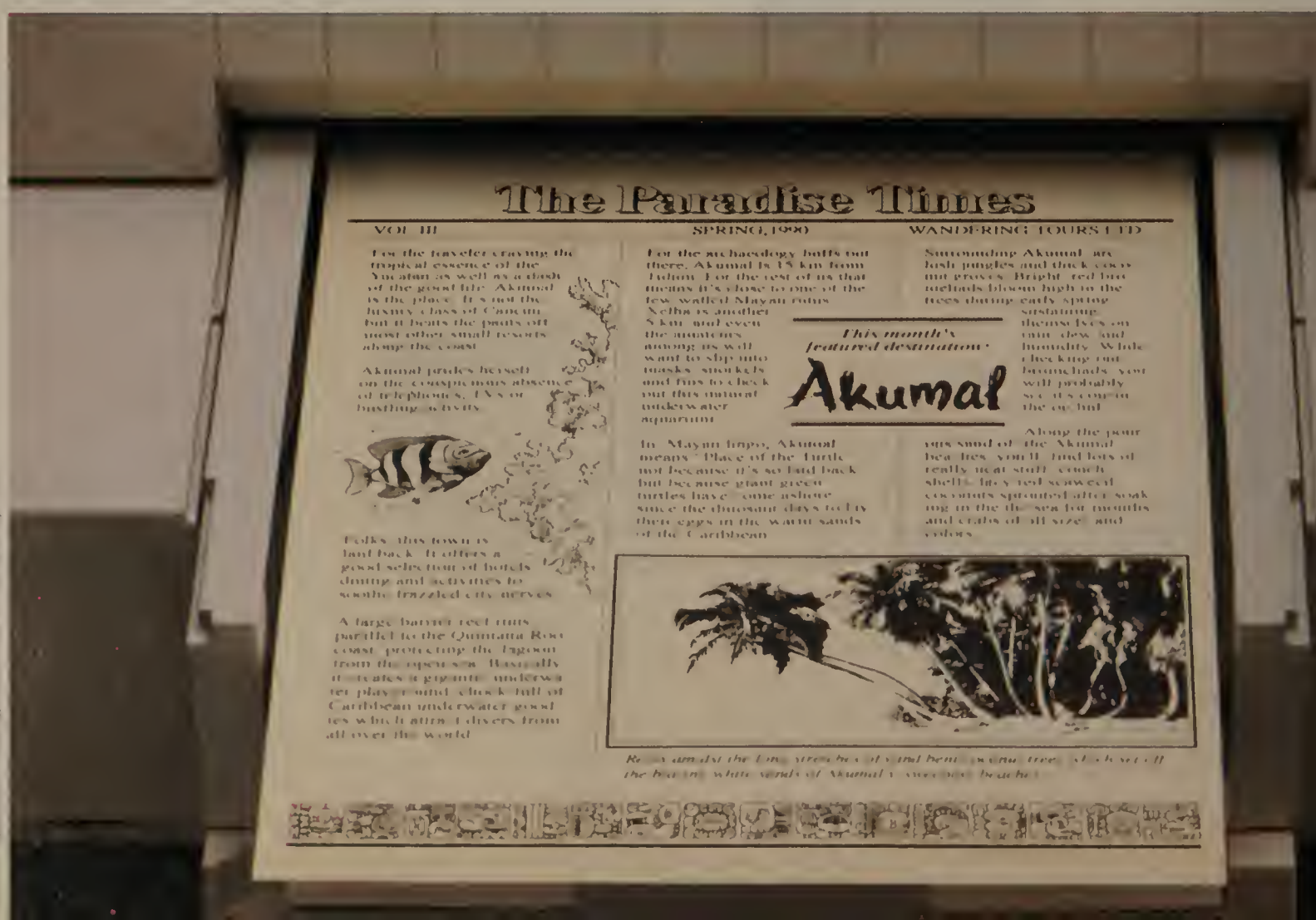
Collection of Mac utility programs that enable the user to analyze and repair data from damaged disks or files, recover files thrown in the Trash, and detect and repair files infected by known Mac computer viruses. Comes with a troubleshooting guide designed to help isolate the cause of a specific problem. 1MB min. memory. $149.95. Microcom, 919/490-1277.

911 Utilities

AdMonitor

Time-billing and accounting package that can be used as a complete business and financial management system for small advertising and public-relations

With the HP DeskWriter, you can



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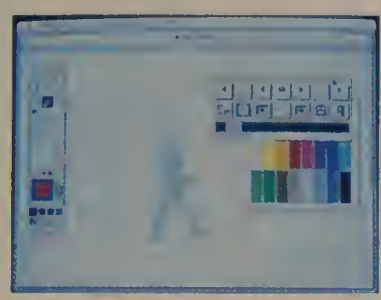
companies. Package comes with two modules: Billing and Tracking, and Accounting. 2.5MB min. memory. With Accounting Module $1595; Billing and Tracking Module only $895. Marketing Resources Plus, 415/494-3900.

Afternoon, a story

Interactive hypertext novel in which the reader selects portions of the text to determine the story line. Written by Michael Joyce. 1MB min. memory. $19.95. Eastgate Systems, 617/924-9044, 800/562-1638.

Animation Works

Path-based animation software that produces up to 8-bit color. Enables you to combine graphics, text, and sound into animations for use in storyboards, comps, or simulations. Provides full set of paint tools to create backgrounds. 1MB min. memory. $199.95. Gold Disk, 213/320-5080.



Animation Works

AS-Trac

Asset-tracking system that provides tracking control for tangible and intangible assets. Transaction file can be updated by reading a bar-coded label and comparing it to an asset tag. 1MB min. memory. $1495. Ensign Systems, 801/546-1616.

BureauMaster

Program that's designed for service bureaus and color prepress shops that automates administrative and operational functions such as accounting and order tracking. Contains functions for telecommunicating, networking, print spooling, page counting and sizing, job tracking, error logging, and customized accounting and billing. 2MB min. memory. $2995. Compumation, 814/238-2120.

Calculus & Mathematica

Courseware package based on Mathematica software. Contains textbook, student-exercise book, software disk, interactive sample programs, and student homework assignments. Covers 30 lesson units. 1MB min. memory. $64.50 per package. Addison-Wesley Publishing Company, 415/594-4467.

Cash Management Module

Cash-management and checkbook-reconciliation program that provides analysis of cash receipts and payments. Draws information from other Great Plains Accounting modules to create deposit slips for bank accounts. Can also reconcile bank statements; allows businesses to use unlimited number of bank accounts. Enables managers to see their sources of cash and how much money is available for short-term investments. 1MB min. memory. $695. Great Plains Software, 701/281-0550, 800/456-0025.

ClearAccess

Desk-accessory interface to CL/1-supported and Oracle databases. Program's Query Builder lists information available for building an SQL-type query and places the results on the

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have it all. (But keep it to yourself.)

The HP DeskWriter printer puts laser-quality printing right at your fingertips.

With a small size and a $995* price tag, the DeskWriter printer easily fits on your desk and in your budget. And its advanced 300 dpi inkjet technology lets you print sparkling text and detailed graphics.

The DeskWriter is also designed for easy use with your Macintosh, and has both serial and Apple Talk interfaces. It even includes scalable and outline fonts. Combine that with the DeskWriter's whisper-quiet operation, and keeping it to yourself will be that much easier. So call **1-800-752-0900, Ext. 1004** for your authorized HP dealer.

There is a better way.

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Clipboard for pasting into any Mac application. 512KE min. memory. $349. Fairfield Software, 515/472-7077, 800/522-4252.

Cosmic Osmo for CD-ROM

CD ROM version of the HyperCard-based fantasy software in which you and a cosmic character, Osmo, journey into a universe and explore such animated environments as the Vegetable Moon, the Paper Planet, different islands, and the insides of cabinets. 1MB min. memory. $69.95. Activision, 415/329-0800.

Cosmic Osmo for CD-ROM

Digitize

Software for ADB digitizing tablets. Enables the user to record points, lines, and polygons in any coordinate system. Measures lengths, areas, and perimeters, and can be used to interactively edit point values. Includes reformatting routines. 1MB min. memory. $250. RockWare, 303/423-5645.

Electronics Workbench

Application that simulates an electronics lab with all the standard (digital module) logic gates and flip-flops. Also simulates a multimeter, word generator, logic analyzer, and a truth table. Gives user full range of linear components with full measuring instrumentation: a function generator, an oscilloscope, and a Bode plotter. 1MB min. memory. $650. Interactive Image Technologies, 416/361-0333.

The Estimator Solution

Stand-alone estimating software written by contractors for contractors. Includes three formats for bid display (automated bid letters, invitation-to-bid letters, and bid duplication); subassemblies; and bills of materials. 2MB min. memory. $295. Vertical Solutions, 805/257-6911.

Flashcards

HyperCard program for creating foreign-language flash cards. Available in Spanish, French, Italian, and German. Blank cards are also available. Enables you to add words, does simple and complex sorting, has functions for reviewing and for making tests, keeps track of user's score for each card. 1MB min. memory. $25. SmartCards, 401/232-5393.

Global Warming

HyperCard stack developed by a group of volunteers from Apple Computer. Uses text, graphics, and animation to explore various aspects of the global warming debate. Provides guidelines for environmental action. 1MB min. memory. $10. EcoNet, 415/923-0900.

Global Warming

GraphMaster

2-D and 3-D chart- and graph-making software for

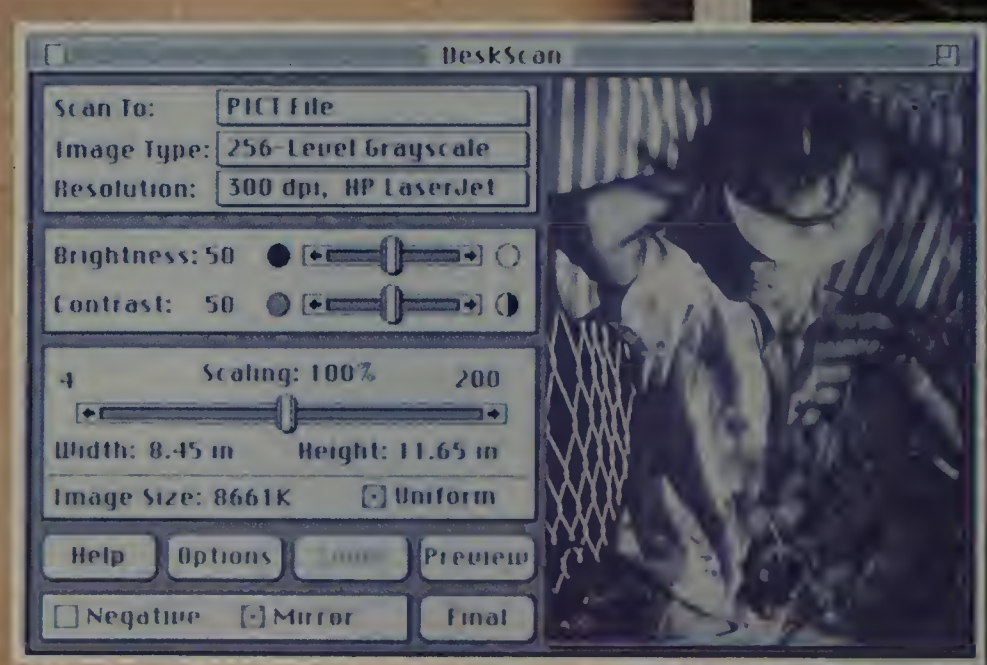
With the HP ScanJet Plus, you've

The HP ScanJet Plus scanner provides 8-bit photographic-quality scanning.

That means 256 shades of gray for the hottest-looking output from your Mac. And it's so easy, too. At the click of a mouse, you can get negative or mirror images, as well as scaling in 1% increments from 4-200%. All for $2,190,* about what you would expect to pay for a 4-bit scanner.

So if you want the richest, most detailed images from your Mac, you've got it made with Hewlett-Packard. Call **1-800-752-0900, Ext. 1005** for your authorized HP dealer.

There is a better way.



For all its amenities, ease of use, good image quality, and low price, *Publish!* recommends the HP ScanJet Plus as their "Best Buy."

HEWLETT PACKARD

business or scientific graphs. Has built-in chart and graph templates for which you supply data; lets you create original charts and graphs. Imports data in Excel 2.2, WKS, SYLK, and text-only formats. Runs in color or black and white. 1MB min. memory. $295. Visual Business Systems, 404/956-0325.

HEC-1 Flood Hydrograph Package

Modeler that simulates the surface-runoff response of a river basin to different amounts of precipitation by representing the basin as an interconnected system of hydrologic and hydraulic components. The resulting data are the computation of stream-flow hydrographs at different locations in the river basin. 1MB min. memory. $395. Hydrotech Microsystems, 503/257-6926.

if:X Payroll Tax Assistant

Payroll-tax forms processing program that displays federal and state forms and schedules on screen in the official IRS format. Includes statements and worksheets specifically designed to expedite payroll tax processing. User enters data directly into displayed forms; the program makes all necessary numerical calculations and checks all input for consistency. 1MB min. memory. $149. SoftView, 805/385-5000.

KiwiFinder Extender

File-retrieval and hard drive–organization tool that adds objects to all Open and Save dialog boxes. Product is designed to enhance the Macintosh's file-management capabilities. 1MB min. memory. $99.95. Kiwi Software, 805/685-4031.

KNET Library

Set of more than 250 C routines used to create, maintain, and query an advanced semantic database. 4MB min. memory. $995. Konexsys, 505/344-8891.

Letterhead

Software that electronically creates personalized stationery. Comes with a library of templates that can be customized with the user's corporate or personal letterhead information. 1MB min. memory. $99.95. Brøderbund, 415/492-3200.

Lite

Computerized automotive business–management system that writes and recalls repair orders and estimates, prints profitability reports, and sends service reminders to customers. Compatible with Smart Automotive Manager. 1MB min. memory. $99.95. Integra Management Systems, 707/833-1823.

Mac I.E.P. Generator

Customized Microsoft Word 4.0 glossary that generates individualized education plans for special-education students. Program contains more than 1000 educational goals and objectives in reading, mathematics, writing, social and emotional development, vocational aspirations, speech, language, gross and fine motor skills, and adaptive behavior. 512KE min. memory. $125

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got it made in the shades.

*Suggested U.S. list price. ©1990 Hewlett Packard Company PE12004

plus $5 s/h. B.H.C. Publishing, 609/799-2061.

MacLaw

Legal practice–management program designed to handle scheduling, billing, and tracking for mail, clients, and operations within a law office. Sections include Attorney File, Billing, Phone Calls, Calendar, Mail, and Multi-party & Class Action. Program is multiuser and expandable. 4MB min. memory. Single user copy $3500; basic multiuser package $5000. Manhattan Software, 213/545-6462, 800/359-6452.

MacSpeakerz

Loudspeaker-design CAD application that calculates and displays the frequency response of any loudspeaker driver/box combination and gives the corresponding dimensions for an enclosure that has that response. Displays dimensions of vents for vented enclosures. 512K min. memory. $145. Tru Image, 619/480-8961.

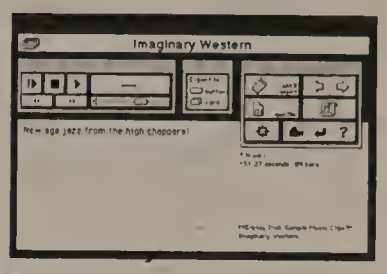
Maxfax

2400-bps modem with 9600-bps send-and-receive fax capabilities. Includes fax modem, MacKnowledge software, Mac cable, and proprietary Maxfax fax-driver software. Software works with all Prometheus modems. 512K min. memory. $449. Prometheus Products, 503/624-0571.

Maxfax

MIDIplay

HyperCard product that plays MIDI files from any stack. The program's primary use is for adding MIDI-based music to multimedia presentations. MIDIplay allows the user to play a file created by a MIDI sequencer and to change parameters of the playback. 1MB min. memory. $59. Opcode Systems, 415/369-8131.



MIDIplay

MusicCard Maker

HyperCard music-notation tool that can be used to make flash cards for music teachers and students. Flash cards can be designed to fit a variety of sizes and formats. Clicking on an on-screen note sounds that note; this feature can be used to create games and exercises. Hard drive recommended. 2MB min. memory $49.95. Little Note Software, 408/978-0473.

NumberMaze Decimals & Fractions

Math software for ages eight and up designed for home and school use. Features a garden maze that offers a variety of obstacles and becomes increasingly complex. Gates are decorated with folk art and can only be passed through when several math problems have been solved. Available in color and black-and-white, and individual and network ver-

With the HP LaserJet III, you can

© 1991 Hewlett-Packard Company PE12000
*Serif depicted conceptually to represents the benefit of variable dot sizes.
† Suggested U.S. list price for full Macintosh configurations including minimum required memory
Adobe and PostScript are registered trademarks of Adobe Systems, Inc. in the U.S. and other countries.

NumberMaze Decimals & Fractions

sions. 1MB min. memory. Black-and-white single version $49.95; color single version $69.95; network version that runs in black and white or in color $329.95. Great Wave Software, 408/438-1990.

OffLine

Disk-management utility. Specialized database-management system that maintains a database on a hard drive, which contains information about unmounted volumes and documents. $79.95. SNA System Network Architects, 609/799-9605.

OS-9

Multitasking, multiuser operating system that runs on all computer platforms designed around the Motorola 68K family of processor chips. Supports high-level languages and is hardware independent. 1MB min. memory. SE version $985; Mac II and later-model version $1150. Ultrascience, 708/256-0080.

Packet/3270 Mac

SNA/ASYNC 3270 emulator that provides common, worldwide access to IBM 3270 SNA mainframe-application systems via dial-up modems and public packet-switching networks. Can be configured with a software component running on the host or with a software-and-hardware mainframe component, which functions as an SNA controller and HPAD protocol adapter. Components sold separately. 1MB min. memory. Single unit $295. Packet/PC, 203/678-1961.

OS-9

PinPoint Error Reporter

PostScript-error handler that reports printing errors that occur in any PostScript or PostScript-compatible printer. Assists users in determining PostScript output problems. Provides detailed report of what has happened when an error occurs. Manual has an Error Dictionary that explains specific types of errors, what causes them, and how to solve them. 1MB min. memory. $49.95. Cheshire Group, 707/887-7510.

PS/Cascade

High-speed PostScript downloader that can transfer data to 32 PostScript devices simultaneously. Sends files to imagesetters, laser printers, and film recorders. Can download to 32 PostScript devices simultaneously; send from compressed files; set transfer calibration routines for positive/negative, paper/film; print EPS files; and provide online error log for each file. 4MB min. memory. $2500. DataStream Imaging Systems, 800/999-4091.

PuzzleMaker

Program for creating and

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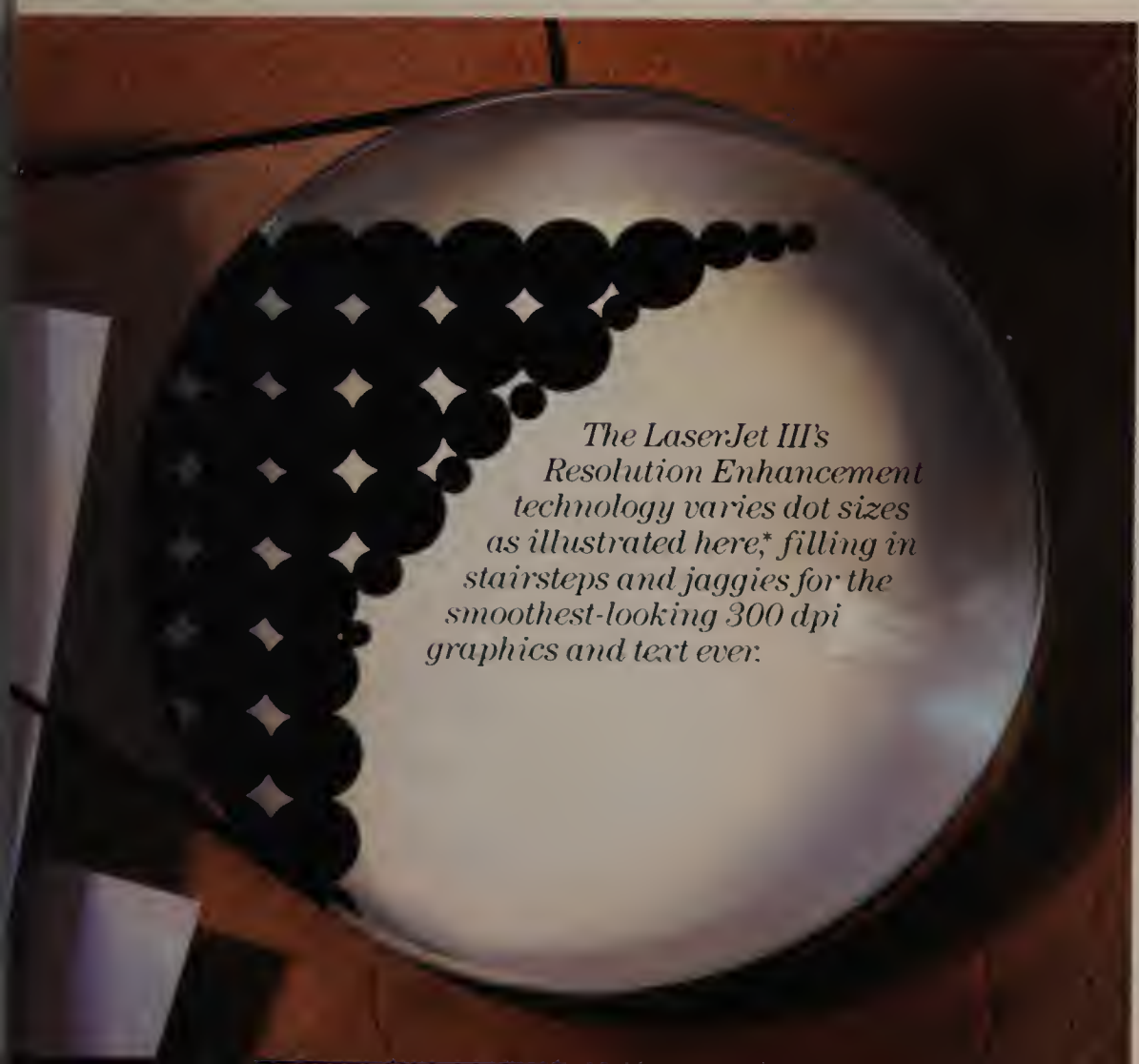
refine your characters.



The HP LaserJet III printer delivers the most refined 300 dpi print quality ever. And it's easy to use. When configured with Adobe® PostScript® and AppleTalk interface, the LaserJet III is completely compatible with your Macintosh. All for only $3,700†.

HP offers other Macintosh compatible LaserJets. The new LaserJet IIID printer with increased paper-handling capability for $5,125†. And the affordable LaserJet IIP printer for only $2,595†. Call **1-800-752-0900, Ext. 1168** for the name of your nearest authorized HP dealer and ask for the Macintosh versions of the LaserJet line.

There is a better way.

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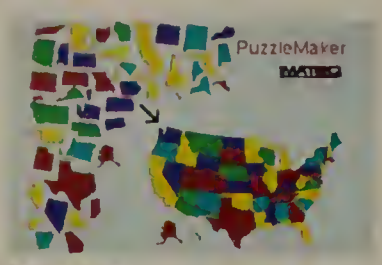
solving puzzles. You can make any image into a jigsaw puzzle, design your own puzzle pattern, or use



PuzzleMaker

one of the patterns provided. Has difficulty levels for both children and adults. 1MB min. memory. $49.95. Imateq Systems, 403/282-6720.

RugOrder

Estimating program for helping carpet and linoleum dealers make accurate order estimates. 512K min. memory. $499. Samuel DeRiggi Jr., 707 Mifflin Ave., Pittsburgh, PA 15221.

Search

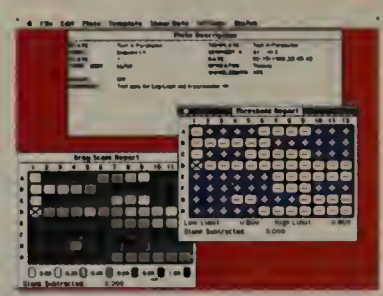
Image-cataloging and -retrieval system designed for the professional publishing environment. Enables one or more users to search for images cataloged in a common database without concern for where the image is stored, whether or not the volume containing the image is mounted, what format the image is in, or what application was used to create the image. 2MB min. memory. Automated Printing Technologies, 714/630-6727.

SmartBundle

Bundled set of T/Maker applications that includes WriteNow 2.2, SuperPaint 2.0, RecordHolderPlus 3.2, and Full Impact 1.1. 1MB min. memory. $349. T/Maker Company, 415/962-0195.

Soft II

Biotechnology software for enzyme and antibody research and genetic engineering. Has automatic microplate-data acquisition and analysis capabilities. Runs in the background. Can be used to produce kinetic analysis, and numeric and graphic data displays. 1MB min. memory. $1250. BioMetallics, 609/275-0133.



Soft II

Swing Shift

Software designed to help with recurring monthly process of scheduling work shifts. Enables you to enter schedules for over 120 workers and more than 9000 shifts. Can be used to print customized calendar for each worker. Scheduling can be automatic or via manual entry. 1MB min. memory. $250. Computed Designs, 818/287-5496

Text Oasis

Desk accessory for use with any foreign-language text for which standard fonts exist. Also works with all languages supported by GLPS, such as Russian, Polish, Hungarian, and other Eastern European languages. Capitalizes, uncapitalizes, sorts, and extracts vocabulary lists from individual paragraphs; does word counts. 1MB min. memory. $49.95. GLPS Products, 919/968-6780, 800/869-9567.

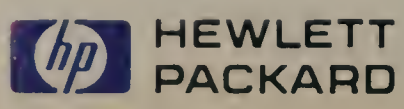
Pigments for your imagination

HP color printers let you draw splashy color from your Macintosh.

Entertain your thoughts with HP's PaintJet and PaintWriter XL color printers. Both are fully Mac-compatible and let you use all Quickdraw-based software applications. That means high-quality Macintosh II output in 16.7 million colors.

Print on paper or transparencies with 13 scalable outline fonts. And for shared use, the PaintWriter XL offers AppleTalk, faster speed, and auto sheet feed. For sample output and the name of your authorized HP dealer, call **1-800-752-0900, Ext. 1167.**

There is a better way.



The USA Factbook

The USA Factbook

Electronic almanac of the United States and its territories. Published annually; includes extensive examination of state geography, vital statistics, government, politics, economies, communications, transportation, and other state- and territory-specific information. 1MB min. memory. $139. Wayzata Technology, 612/447-7321, 800/735-7321.

ACCESSORIES

MacPro Plus

Keyboard that is compatible with every Mac including older models that use the RJ-11 interface. ADB and RJ-11 cables are included with purchase price. $197. Keytronic, 509/928-8000, 800/262-6006.

Mouse Trap

Security product that attaches the mouse cord to a security cable and provides a tamper-proof screw designed to prevent theft. $9.95. University Products, 216/892-2030.

MVP Mouse

Trackball with plug-in compatibility and opto-mechanical engineering. Ergonomically designed with three buttons that wrap around the top two-thirds of the trackball and a sloped palm rest with traction to prevent slipping and reduce the wrist pain associated with the use of traditional trackballs. Comes with expanded custom Control Panel that allows the user to assign any of several commands to the three buttons. Functions may be assigned to buttons in any order, according to user's needs. $149.95. Curtis Manufacturing, 603/532-4123.

MVP Mouse

BOOKS

Digital Color Prepress Booklet

Reference guide designed to educate graphic arts professionals about color prepress. Book explores electronic prepress concepts, issues, and processes. Addresses a wide variety of topics such as trapping, screen angles, creating halftone images, page layout, file formats, and image-setting and color proofing. Free. Agfa Compugraphic Division, 508/658-5600.

. . . . . .

To have your product considered for inclusion in *New Products*, send an announcement with product name, description, minimum memory, peripherals required, pricing, company name, and phone number (and two copies of software) to New Products Editor, *Macworld*, 501 Second St., San Francisco, CA 94107.

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COMPARISON OF COMPETITIVE PRODUCTS

	MicroNet	Ricoh	Bernoulli
System w/ Cartridge	$1,145	$1,428	$1,920
Single Cartridge Cost	$129	$129	$125
Average Seek Time	20 ms	25 ms	32 ms
Head Cleaning Kit	N/R	N/R	$65
Interface Kit for Macintosh	N/R	N/R	$55
Head Load Time	0 ms	0 ms	165 ms
Media Life (100% duty cycle)	5 yrs	5 yrs	1/2 yrs
Winchester Technology	Yes	Yes	No
Noise Level	< 50 dBa	55 dBa	48 dBa
Installed Base	450,000	50,000	600,000

Prices listed are manufacturers' suggested retail price.

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Quick Tips

Color gradation, custom mouse tracking, accelerating StuffIt, and more

BY LON POOLE

The contribution to the greenhouse effect by idle computers not in use is much worse than what I stated last October. Rick Heede of the Rocky Mountain Institute and others corrected my arithmetic errors. In fact, generating the electricity to keep 20 percent of all personal computers nationwide running nights and weekends for a year would result in emissions of over 9.5 million tons of carbon dioxide. That's the equivalent of driving 36 million miles at 28 miles per gallon. So turn off your Mac when you're not using it.

Desktop Color Publishing

For an elegant and informative introduction to color publishing using PostScript-based systems, you should read the 32-page book *An Introduction to Digital Color Prepress.* It's a broad overview of the software, hardware, and people involved in the prepress process. The well-written text and informative illustrations also explain once-arcane topics such as color space models, trapping, density, undercolor removal, and gray-component replacement. For a free copy, write to Marketing Communications Dept., Agfa Compugraphic, 200 Ballardvale St., Wilmington, MA 01887.

Rebuilding Time

Q In the September issue, you recommended using Alsoft's DiskExpress utility to rebuild the invisible Desktop file, reducing its size. However, AlSoft technical support says that DiskExpress II does not rebuild the Desktop file because doing so doesn't noticeably improve performance, causes compatibility problems with MultiFinder, and won't be required with System 7. I'd appreciate any clarification you can provide.

Ben Kraieski
Chambersburg, Pennsylvania

A Rebuilding the Desktop file can definitely improve a hard drive's performance. When the Finder takes forever to copy a file onto your hard drive, and displays the message "Updating desktop file" for longer than a few seconds at the end of the copy process, it is time to rebuild. The next time you start the Mac, hold down the ⌘ and Option keys until you see a message asking if you're sure you want to rebuild the desktop. Click OK to authorize rebuilding. If you have more than one hard drive, keep pressing ⌘ and Option until the Mac has asked you about each drive. Rebuilding is completely compatible with MultiFinder. However, you do lose any comments you've typed into the Get Info window, and occasionally some icons become blank. That's why I recommended DiskExpress, which doesn't erase the comments or blank any icons. AlSoft probably removed Desktop file rebuilding from DiskExpress II so it would be compatible with System 7, which when it arrives will use a newer, more efficient method to keep track of Finder information, one that doesn't require periodic rebuilding.

Smoothly Gradated Fills

Q I see lovely gradated colors in *Macworld.* Is this a donkey's carrot or is it really possible? I get bands in the gradated colors I create using Illustrator and FreeHand. Try explaining that to clients!

David Ferrington
Clematites, Switzerland

A According to *Macworld* artist and designer Arne Hurty, banding in a gradated fill can be caused by a combination of factors: the distance covered by the gradation; the output device's resolution in dpi (dots per inch); the frequency of the halftone screen in lpi (lines per inch); and the beginning and ending percentages for each color channel (cyan, magenta, yellow, and black) of the fill (see "To Beat the Bands"). Here is how to tell whether to expect banding. For each channel, compute the number of shades in the fill area using this formula:

(beginning percentage – ending percentage) × (dpi lpi)^2

(continues)

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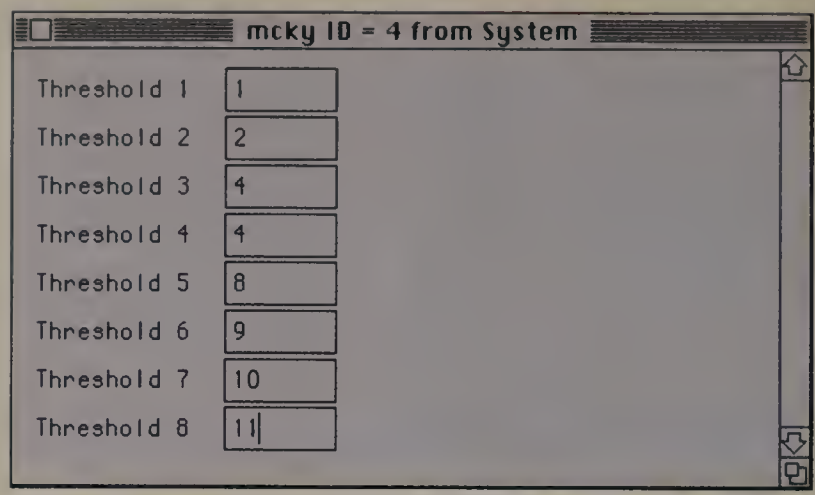


MOUSE THRESHOLDS To get mouse tracking that's faster than the normal top speed, use ResEdit to change resource mcky 4 in the System file to the values shown here.

For example, a fill that ranges from 100 percent black to 10 percent black printed on a 1200-dpi imagesetter using a 133-line halftone screen would have 73 shades of gray.

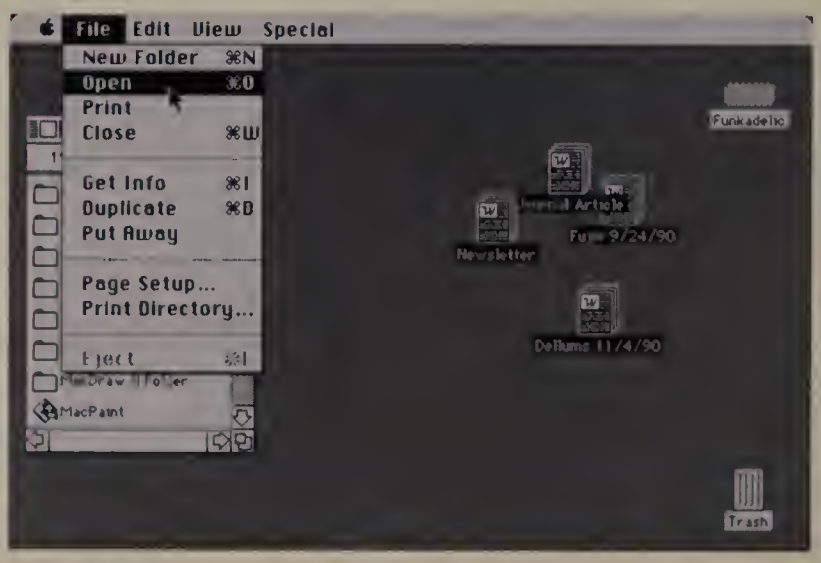
To compute the rate at which shades change, divide the number of shades by the distance covered by the gradation. If the fill in the example covered 72 points (one inch), then the rate of change would be an ideal one shade per point. For some colors, you may get away with rates higher than one shade per point. For example, if magenta is changing at one shade per point, then it may conceal a coarser change in yellow of one shade per pica (12 points). Banding is least perceptible in yellow, more so in cyan, even more so in magenta, and most in black. Remember also that you amplify banding by using the same percentage range for two or more color channels. You can lower the risk of banding by making the fill area smaller, increasing the percentage range, lowering the lpi, or raising the dpi.

When blending two objects using Illustrator's Blend tool or FreeHand's Blend command, you might think that you could decrease banding by increasing the number of intermediate elements. However, the number of shades available is solely a function of color percentages, dpi, and lpi (as calculated by the formula above). If you create twice as many intermediate elements as available shades, each shade must be spread across two intermediate elements.

Additionally, FreeHand's Graduated command can create at most 100 steps between the beginning and ending colors when the Print command's Print Quality option is set to Faster. If the formula above shows the number of available color bands to be greater than 100, you can get less banding by setting the Print Quality option to Better or by using the Blend command instead of the Graduated command. Admittedly, setting up a blend between objects is more work than filling one object with the Graduated command.

One last factor: PostScript limits you to 256 shades per color channel. If your output device dpi, halftone screen lpi, and color percentage range provides more shades, PostScript

(continues)



OPENING ACT The selected documents have been dragged to the desktop from various folders and are about to be opened all at once.

The only thing stopping you now is your imagination.

Just imagine a hard drive for the Macintosh line of computers that lets you spend less time waiting and more time creating. A drive that maximizes your computer capabilities and makes fast work of database management, desktop publishing and computer-aided design. A drive that can connect your network in a flash, and be very reliable. It's not a dream. Rodime Systems' Cobra Series offers access times as low as 14.5 milliseconds and storage as high as 650MB. And up to 48K of look-ahead caching to take advantage of the high performance of these drives. Cobra internal drives range from 45MB to 210MB while our external Cobra drives go from 45MB to 650MB. So, you can work with a long list of advanced software applications.

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RODIME SYSTEMS

Rodime Systems, Inc., 901 Broken Sound Parkway, Northwest, Boca Raton, Florida 33487

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computes an even distribution of 256 shades.

BBS Directory

Q I'd like to buy a modem for downloading programs from BBSs (bulletin board systems) and exchanging data with friends. How do I get BBS phone numbers?

Matt Leonard
Newport News, Virginia

A Dennis Runkle compiles a list of mostly unverified BBS phone numbers and posts it, along with periodic updates, on CompuServe (file BBSLST.SIT in DL9 of the MacComm forum) and Delphi Icontact (Telecommunicating). He lists two in your area code: 804/486-7322 and 804/276-7368, both for Roundtable BBS with sysops (system operators) Ray and William Woodson. Try calling these or any other numbers on Runkle's list with a telephone before using a modem. If you hear a high-pitched squeal, the BBS is ready to connect. If you repeatedly get a busy signal, either the BBS is very popular or someone likes to talk a lot. If a human answers, ask whether the BBS is still in operation and what its hours are. As for CompuServe and Delphi, trial memberships will probably be included with the modem you buy.

Multiple Openings

TIP: Here's a basic tip I find very useful. To open several documents at once, select their icons and then double-click one or choose Open from the Finder's File menu. To select multiple icons, press Shift as you click each one, or drag a net around a group of icons (see "Opening Act"). All the icons you want to select must be in the same window or on the desktop. If they're not, then drag them to the desktop temporarily and return them to their folders later using the Put Away command (File menu). If MultiFinder is active, you can open multiple documents created by more than one program.

Richard A. Vento
Culpeper, Virginia

Custom Mouse Tracking

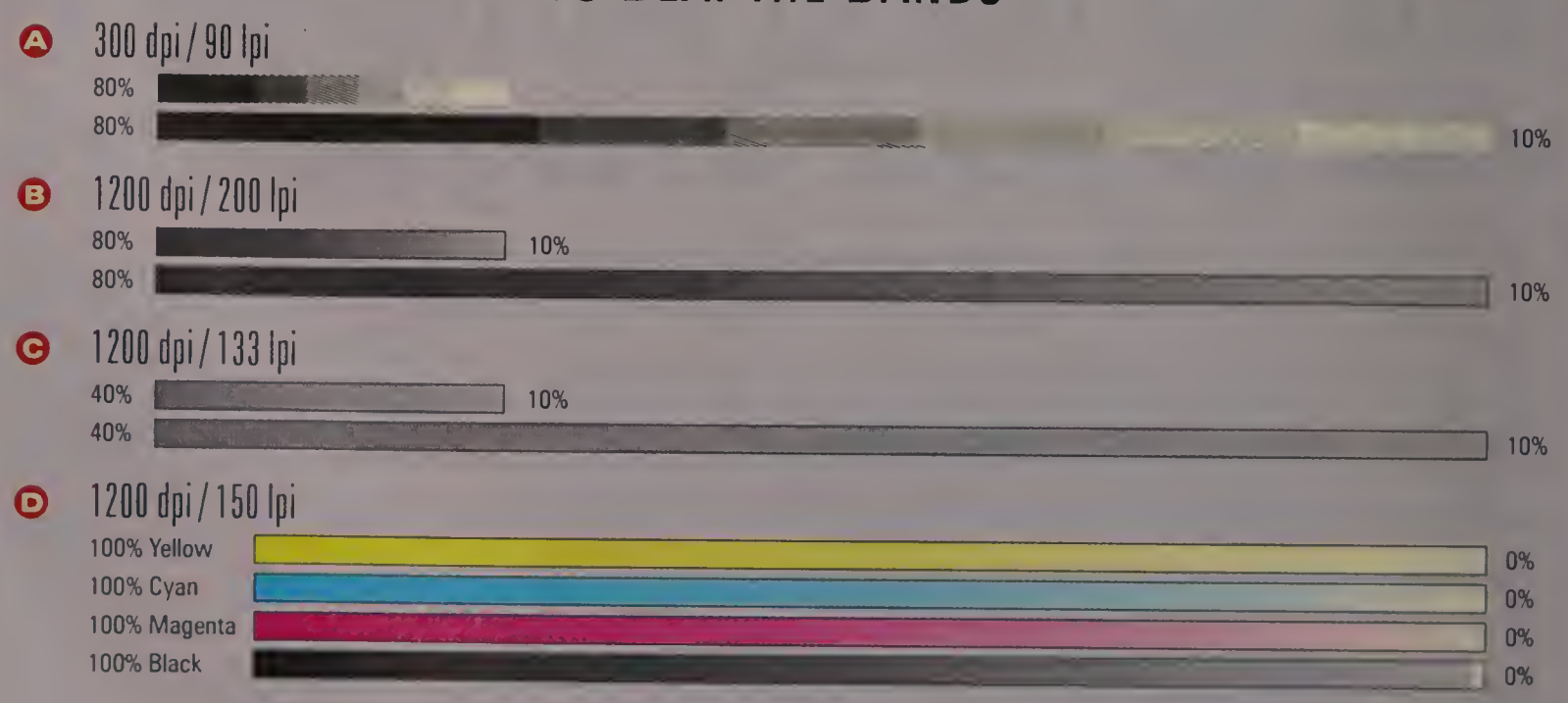
TIP: Beginning with system software version 6.0.4, the System file includes an editable resource named mcky. The five mcky resources numbered 0 to 4 correspond to the five speed choices, Tablet to Fastest, in the Mouse Control Panel. By using ResEdit version 2.0b2 or later, you can edit the resources and adjust the mouse's responsiveness to suit your work habits.

Each mcky resource has eight threshold levels that determine how mouse movements affect pointer motion on the screen. For instance, the fastest speed, resource mcky 4, is preset to thresholds of 1, 4, 7, 10, 13, 15, 16, and 255. I reset those values to 1, 2, 4, 4, 8, 9, 10, 11. Acceptable values range from 1 to 255, with lower numbers generating higher speeds and greater responsiveness.

Wayne Kauffman
Clayton, Indiana

Start by making a copy of your System file (use the Finder's Duplicate command). Open ResEdit and use it to open your copy of the System file. Scroll through the list of resource types until you find mcky, and double-click it to open it. A list of specific mcky resources appears. Double-click the one you want to edit. In the dialog box that appears, change the threshold values as you like (see "Mouse Thresholds"). Quit ResEdit, saving your changes. After you've dragged the original, unedited System file out of the System Folder, drag the edited copy into it. Make sure the edited System file is named System. Restart your Mac. As a precaution, make a backup copy of your original, unedited System file and then drag the original to the Trash.—LP

To Beat the Bands



A number of factors can lead to banding in a gradated fill. The risk of visible bands in gradated shades or colors increases proportionally as **(A)** the printer resolution decreases, **(B)** the line frequency increases, and **(C)** the change in color decreases. **(D)** Some colors show banding more than others. As the first three examples show, the longer the distance between beginning and ending colors, the more banding you'll see.

EXACT ALIGNMENT

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Meats	Vegetables	Breads	Condiments
Turkey	Lettuce	Wheat	Mayonnaise
Pastrami	Green Peppers	White	Mustard
Tuna	Black Olives	Rolls: Kaiser	Horseradish
Lox	Green Onion	Onion	Oil & Vinegar
Roast Beef	Tomatoes	Sourdough	Pickle Relish
Ham	Onion	Bagel	

Align indented text with the line above it by repeating the same text at the beginning of both lines, typing the second line of text in Reverse style.

Phantom Tab

TIP: When working on a PageMaker document, you may need to indent a line of text to align with text on the line above it. Because you can't accurately measure the width of the indentation, it's difficult to set a tab precisely. Try this: Choose the Reverse style (Type Style submenu in the Type menu) and retype the text exactly as it appears in the line whose spacing you're matching. Stop when you reach the desired indentation point. Choose Reverse again to turn it off, then type the new text. For some finished examples, see "Exact Alignment."

This method is equivalent to the commonly used typesetting commands Flash Only (Varityper) and Space Only (Compugraphic). The method also works when normal text is white on a reverse background.

Jan Fonda
Fort Collins, Colorado

This tip should work with any page-layout or word processing program that lets you set text color to the background color.—L.P.

Accelerating StuffIt

TIP: I've discovered that the shareware version of StuffIt—StuffIt Classic or StuffIt 1.5.1—works faster from a floppy disk than from a hard drive. You can save a considerable amount of time by starting from a floppy and using a copy of StuffIt from that floppy. This seems to defy the fact that floppy drives are slower than hard drives. You can speed up StuffIt even more by including a screen saver such as Moiré on that floppy and turning it on while stuffing or unstuffing.

Evan Marc London
Yonkers, New York

It took me 73 seconds to unstuff a 98K archive running StuffIt 1.5.1 from my 80MB Apple hard disk. Turning on the After Dark screen saver and still running from the hard disk cut the time to 53 seconds. After restarting the Mac and running StuffIt from a floppy, unstuffing the same archive took 50 seconds without a screen saver, and 43 seconds with. Times doubled when I set the number of colors or grays displayed (under Monitors in the Control Panel) to 256 instead of Black & White.—L.P.

We pay from $25 to $100 for tips published here. Send tips or questions (include your address and phone number) to Quick Tips, Macworld, 501 Second St., San Francisco, CA 94107. Send electronic mail to CompuServe (70370,702) or MCI Mail (294-8078). All published submissions become the property of Macworld.

Lon Poole answers readers' questions and selects their tips for this monthly column. He has written many personal-computer books, including the quick reference HyperTalk *(Microsoft Press, 1988) and a new book of Mac tips,* Amazing Mac Facts *(Microsoft Press, January 1991).*

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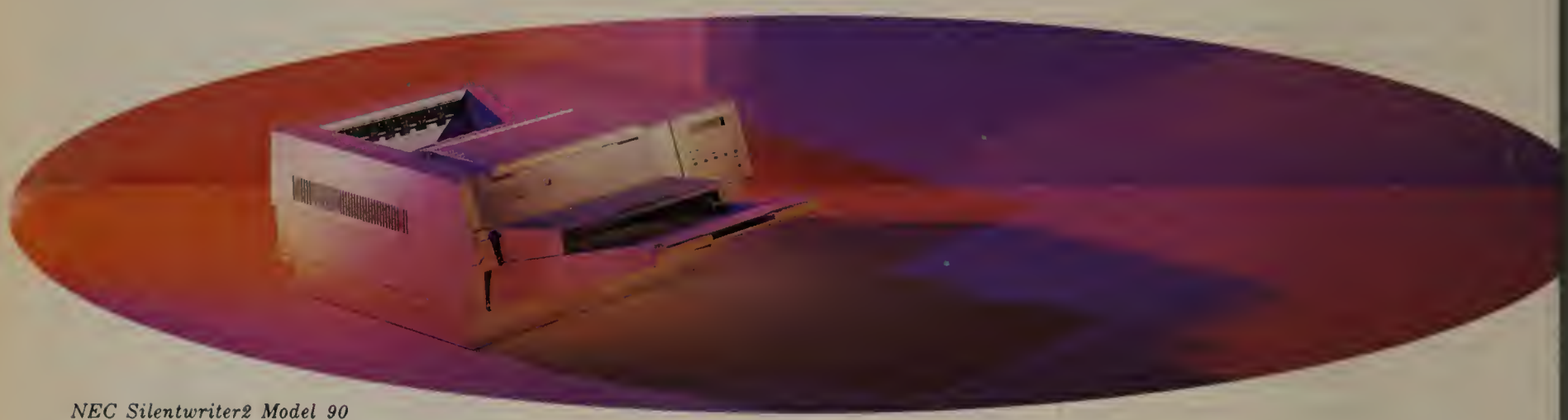
All things being equal, they're not.

They're made by two very good companies. They both have the same great features. Yet, there's one thing that makes NEC's Silentwriter®2 Model 90 look better on paper than the Apple Personal LaserWriter® NT. It's eight hundred dollars less.* Pretty amazing, when you consider how much NEC's Silentwriter2 has going for it. Of course, it's completely MAC compatible. It also has WYSIWYG screen fonts, 2MB of memory, the ability to do envelopes and the richest blacks you've ever seen. All this and it's MS/DOS compatible and 2PPM faster, too. But most importantly, the Silentwriter comes with Adobe® PostScript®. So whether you're printing newsletters or flyers, sales sheets or shareholders reports, you'll have thirty-five different typefaces to help you create the most dazzling documents possible. For product literature, call 1-800-NEC-INFO. NEC's Silentwriter2 Model 90. Take a close look and you'll find it has no equal.

*Apple Personal LaserWriter NT. $3,295***



*NEC Silentwriter2 Model 90 with PostScript. $2,495***

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**Manufacturers suggested retail price.

C&C Computers and Communications

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Getting Started with Mac Operating Techniques

TECHNIQUES FOR MASTERING YOUR MAC AND EXPLOITING ITS POWER

BY JIM HEID

What do violin virtuosos, Olympic gymnasts, and pizza chefs have in common? They've all attained that level of expertise at which their skills just seem to flow from within. You know what they're doing comes from practice and experience, and still you can't help but say it: they make it look so easy.

A Mac novice often has similar thoughts when watching an experienced user. The mouse pointer races across the screen, keys clatter, and windows whoosh by at a pace that's hard to keep up with.

The Mac is an easy-to-use machine that's also powerful and complex. And because it's so easy to learn basic Mac tasks, many people never venture into the nooks and crannies that help make the machine so powerful.

This month, I'll present a collection of Mac operating insights and techniques—things Mac veterans talk about in their sleep, but that occasional or new users may not know about. Some items here are inspired by readers' letters; others come from my own experience helping Mac users. Still others I've mentioned in previous columns, but they're valuable enough to bear repeating.

Do You Know What MultiFinder Is?

One reader recently wrote that he upgraded his Mac from 1 megabyte (MB) to 4MB of memory but noticed virtually no difference in performance. "Did my dealer rip me off?" he asked. I suggested he might not have his Mac set up to use MultiFinder, which would exploit that extra memory to let him run several programs at once. A few days later, a grateful reply arrived. He hadn't known about MultiFinder. A few weeks after that, I visited someone whose brand-new 4MB Mac IIcx wasn't using MultiFinder either.

MultiFinder received a great deal of coverage when it was released in 1987. Since then, however, there's been little introductory information on this major player in the Mac's system software. As a result, newcomers to the Macintosh may not know about it unless they read their manuals—and many do not.

MultiFinder eliminates your having to quit one program to start another. It also makes working with files and disks more convenient because the Trash and the rest of the Finder's features are always available. (Don't confuse MultiFinder with the Finder; MultiFinder lets you run multiple programs simultaneously, while the Finder is what you use to start programs and manage disks.) And if you have an Apple Personal LaserWriter SC or an Adobe PostScript–based laser printer (such as Apple's Personal LaserWriter NT, Apple's LaserWriter IINT or IINTX, or Texas Instruments' microLaser), MultiFinder provides a *background printing* option that permits you to save time when printing (see last month's *Getting Started*). The more memory your Macintosh has—2.5MB is the minimum for MultiFinder, 4MB or more is preferable—the more applications you'll be able

(continues)

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FINDER SHORTCUTS

To accomplish this	Do this
Bypass the warning dialog box	Press Option while dragging when you discard an application or the System file to the Trash
Close all open disk/folder windows	Press Option while clicking on any window's close box or choosing the Close command. *Or,* Press Option immediately after quitting an application (doesn't work with MultiFinder)
Move an inactive window without activating it	Press ⌘ while dragging the inactive window's title bar (works in applications, too)
Copy a file from one folder to another	Press Option while dragging the file to the destination folder
Start MultiFinder when the Finder is running	Press ⌘ and Option while double-clicking on the MultiFinder icon is running in the System Folder
Quickly determine whether a file is locked or unlocked	Select the file, and move the pointer over its file name; the I-beam appears if it's unlocked
Quickly switch between applications	Click the icon at the far right of the menu bar when running under MultiFinder
Align all icons in a window	Press Option while choosing Clean Up from the Special menu
Program a disk/folder to close automatically when you return to the Finder	Press Option while opening the window (doesn't work with MultiFinder)

to run simultaneously.

Setting up your Mac to use MultiFinder is easy: Choose the Set Startup command in the Finder's Special menu, select the MultiFinder option, and click on OK. Finally, choose Restart from the Special menu. (I've described a quicker method in "Finder Shortcuts," which lists a number of other nifty features the Finder provides as well.) Your Mac manual explains MultiFinder's benefits in detail. Pay particularly close attention to the section that describes how to fine-tune your program's memory requirements. By doing so, you can get better performance or squeeze more programs into memory at once. (Also see "More for Your Memory," *Macworld*, April 1990. For background on how MultiFinder works, see "Getting Started with Multitasking," *Macworld*, June 1988.)

Another reason to master MultiFinder now: if you plan to use version 7.0 of the Mac's system software—which Apple expects to release sometime this year—MultiFinder will be the only game in town. With System 7.0, you won't have a choice of running under the standard Finder anymore.

Clipboard 101

The ability to use the Mac's Clipboard to move information between programs has always been one of the Mac's greatest strengths. Thanks to the Cut, Copy, and Paste commands that virtually all Mac programs provide, you can include graphics in a word processor document, and paragraphs of text in a drawing.

Apple's ads often showcase this ability by depicting a fancy business

(continues)

New Ventura Publisher for Macintosh. It flies through long documents.

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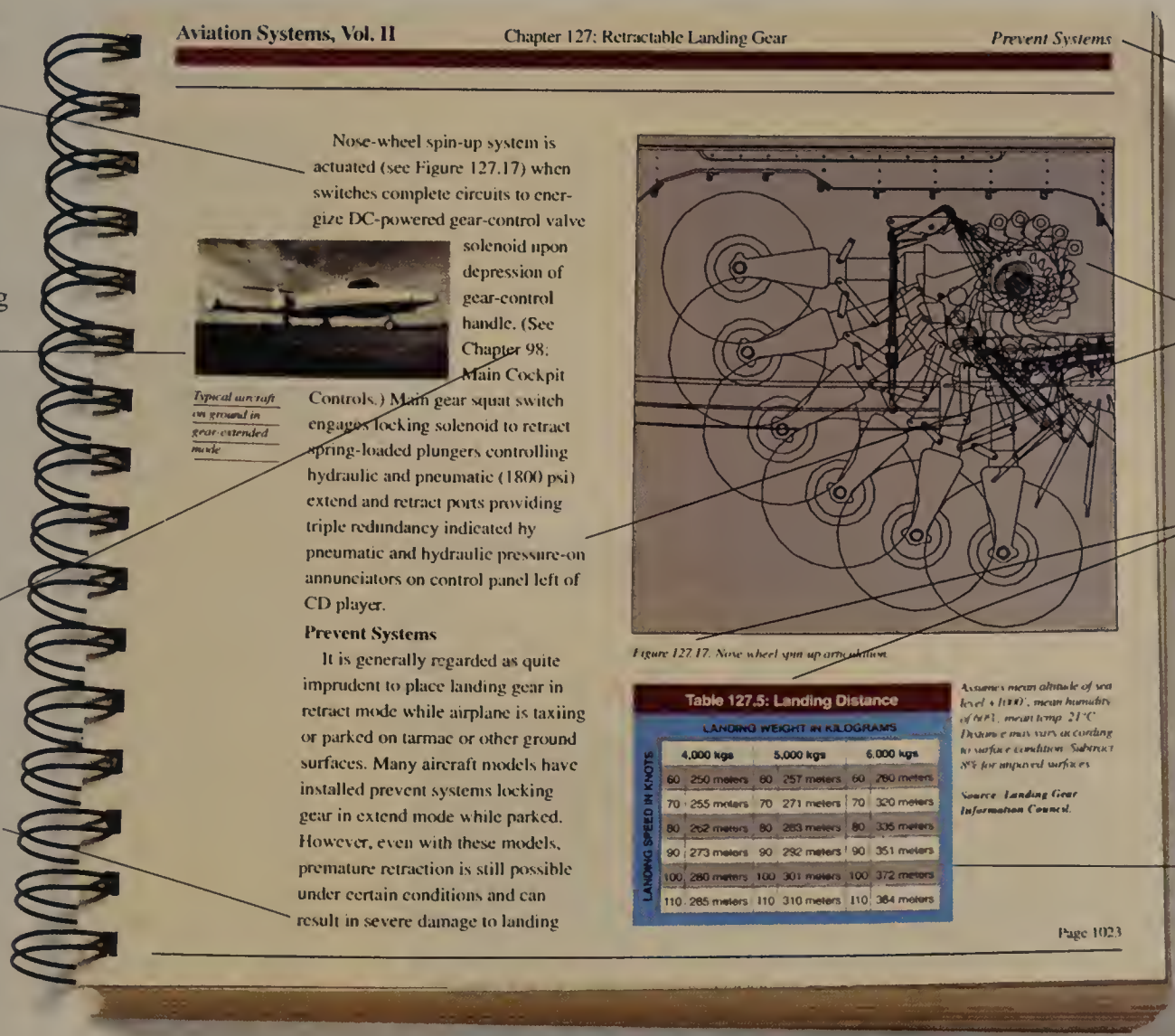

Aviation Systems, Vol. II — Chapter 127: Retractable Landing Gear — *Prevent Systems*

Nose-wheel spin-up system is actuated (see Figure 127.17) when switches complete circuits to energize DC-powered gear-control valve solenoid upon depression of gear-control handle. (See Chapter 98: Main Cockpit Controls.) Main gear squat switch engages locking solenoid to retract spring-loaded plungers controlling hydraulic and pneumatic (1800 psi) extend and retract ports providing triple redundancy indicated by pneumatic and hydraulic pressure-on annunciators on control panel left of CD player.

Typical aircraft on ground in gear-extended mode

Prevent Systems

It is generally regarded as quite imprudent to place landing gear in retract mode while airplane is taxiing or parked on tarmac or other ground surfaces. Many aircraft models have installed prevent systems locking gear in extend mode while parked. However, even with these models, premature retraction is still possible under certain conditions and can result in severe damage to landing

Figure 127.17. Nose wheel spin up arrangement

Table 127.5: Landing Distance

LANDING SPEED IN KNOTS	LANDING WEIGHT IN KILOGRAMS: 4,000 kgs	5,000 kgs	6,000 kgs
60	250 meters	257 meters	260 meters
70	255 meters	271 meters	320 meters
80	262 meters	283 meters	335 meters
90	273 meters	292 meters	351 meters
100	280 meters	301 meters	372 meters
110	285 meters	310 meters	384 meters

Assumes mean altitude of sea level + 1000', mean humidity of 60%, mean temp. 21°C. Distance may vary according to surface condition. Subtract 8% for unpaved surfaces.

Source: Landing Gear Information Council.

Page 1023

Headers and footers can be automatically linked to selected text on each page.

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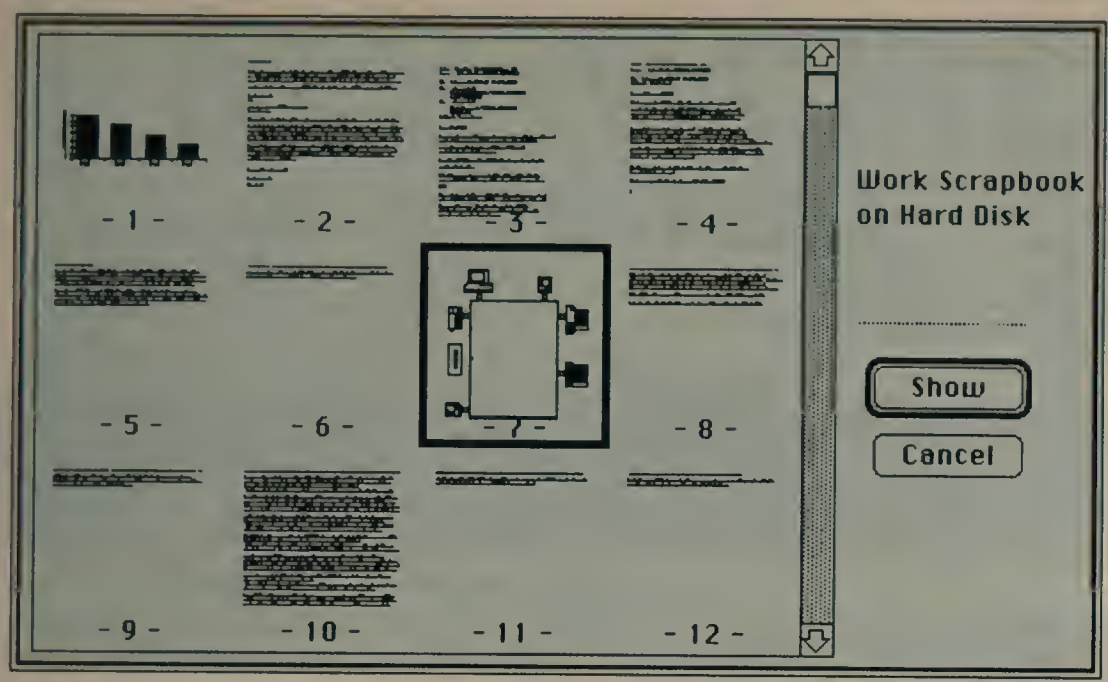
report with a chart shoehorned into it. Combining text and graphics to create what are often called *compound documents* is certainly one way to put the Clipboard to work. But don't ignore its more mundane uses. Recycle text or part of a graphic by copying it from an older version of a document. If you're always typing a finger-twisting scientific term, copy it to the Clipboard and paste it each time it's needed. To remind yourself of what's in a word processor document, copy the first few lines of it and paste them into the Finder's Get Info window for that document—more about Get Info shortly.

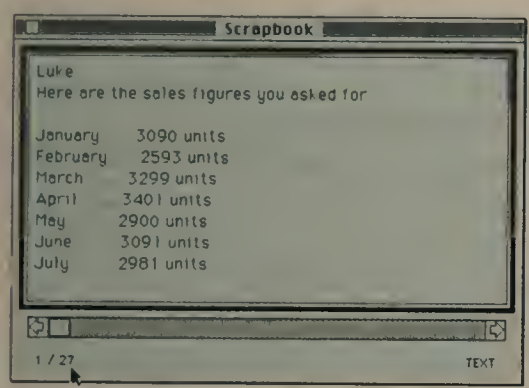
If you use the Calculator desk accessory (DA), you can copy the result of a calculation and paste it into a document; simply choose Copy after performing the calculation. You can also paste numbers and math symbols from the Clipboard to the Calculator. You'll even see the Calculator's keys flash to reflect what you've pasted. (You'll also hear a lot of error beeps if you paste characters that don't correspond to keys on the Calculator.) And here's a handy way to "stamp" a document with the time you started working on it: select the Alarm Clock DA from the Apple menu, choose Copy to put the current time and date on the Clipboard, and then paste it at the beginning of your document.

The Clipboard's contents vanish when the Mac is switched off, but you can save them using the Scrapbook DA: just open the Scrapbook and choose Paste. Doing so adds a new "page" containing the Clipboard's contents to the Scrapbook. To retrieve an item from the Scrapbook, use the scroll bar to get to the desired page, then choose Copy from the Edit menu (or Cut to remove the item from the Scrapbook).

The Scrapbook's contents are stored in a file called Scrapbook File, which is located in the System Folder. If you want to move your Scrapbook to another Mac, just copy the Scrapbook File to a floppy disk and then copy it to the System Folder on the second Mac. Note that you'll replace the existing Scrapbook; you might want to stash the existing one in a folder first.

If you use the Scrapbook exten-





A SMARTER SCRAPBOOK Apple's Scrapbook limits you to just one Scrapbook file and shows only one page at a time (bottom). Alternatives to Apple's bare-bones desk accessory include Olduvai's MultiClip and Solutions International's SmartScrap (top). The table-of-contents feature shows numerous Scrapbook pages in reduced form. You can jump to a specific page by double-clicking on it, and you can name pages for fast searching. You can also switch between different Scrapbook files.

sively, consider one of the more powerful Scrapbook alternatives such as Solutions International's SmartScrap or Olduvai Software's MultiClip. Both support multiple Scrapbook files, allowing you to create separate ones for, say, text and graphics. Each also provides a table-of-contents feature that shows lots of pages reduced to fit within a window and allows you to jump to a specific page by double-clicking its tiny version (see "A Smarter Scrapbook").

Know Your Navigation

The Finder and most Mac programs are replete with navigational shortcuts that let you choose commands without reaching for the mouse, open files and windows quickly and select large passages of text in a flash. But alas, many people use only the basic click-and-drag techniques they mastered in their first hours with the machine. They're using training wheels to ride a Harley—and they're working harder than they have to.

One step toward balancing yourself is mastering the *double-click*, two mouse clicks in rapid succession. At the Finder, double-clicking on an icon is the same as clicking on it once and then choosing Open; double-click on a disk or folder icon to view its contents, or double-click on a program or document icon to open it. In a word processor (or in any text-editing area), you double-click on a word to select it—it's faster than manually dragging the pointer over the entire word.

Most Mac programs have their own double-click shortcuts. In Microsoft Word, you can select a paragraph by double-clicking to its left. In Claris's FileMaker II and FileMaker Pro, double-click on a field name to modify it. In MacDraw II, double-click on a tool and you can draw one shape after another without having to reselect the tool each time. In QuarkXPress, double-click on a text block or graphic to display the Modify dialog box. The list goes on—and you'll find it in your manuals.

As for keyboard navigation, you just can't beat the ⌘-key shortcut. By pressing the ⌘ key along with the appropriate letter key, you can choose commands without reaching for the mouse. Most Mac programs use the same key sequences for certain File

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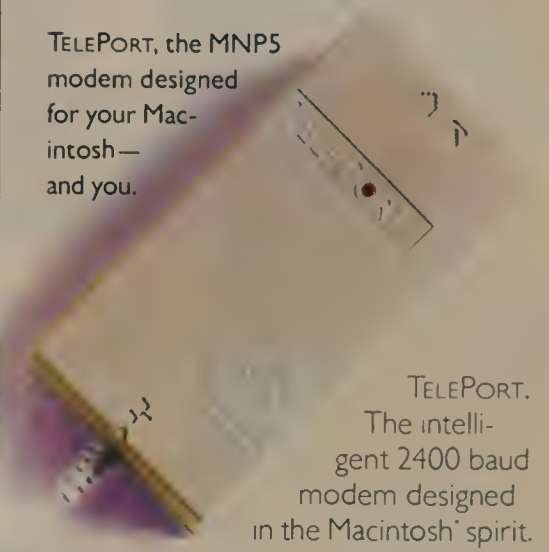

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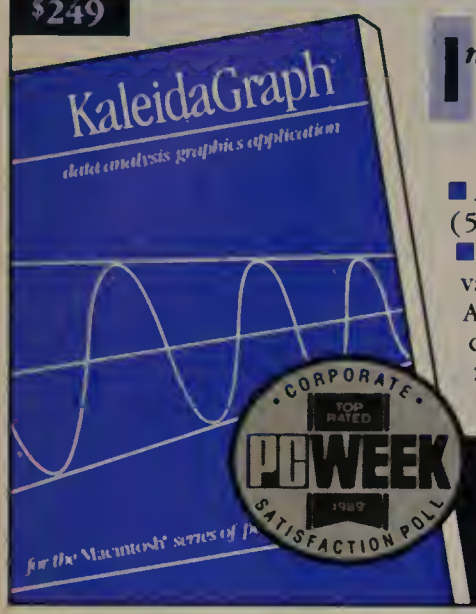

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and Edit menu commands. And finding ⌘-key shortcuts is easy: just look in a menu—the shortcuts appear to the right of their corresponding commands.

The best navigation habit you can develop is to periodically press ⌘-S to save your document as you work. Do it every few minutes—every time you pause for inspiration, switch to a different program under MultiFinder, or get a phone call—and you won't lose much if a power failure or system error occurs. (Incidentally, don't be alarmed if a program doesn't have a Save command—many programs, including Apple's HyperCard and most database managers, save automatically as you work.)

Other Key Shortcuts

But keyboard navigation is not limited to ⌘-key shortcuts. In a dialog box with numerous text-entry areas (such as the Print dialog box), you can move from one text area to the next by pressing the Tab key (see "Dialog Box Shortcuts"). And when a dialog box has a button with a heavy border around it, you don't need to click it with the mouse to choose it; simply press Return. Such buttons always correspond to the action you're most likely to take using that dialog box—examples include Save and Open.

Speaking of the Save and Open dialog boxes, they provide several keyboard shortcuts of their own. In an Open dialog box, you can quickly select a specific document or folder by typing the first character or two of its name—you don't need to scroll to locate the item and then click on it to select it. Many people exploit this trick by preceding the names of often-used folders or files with a number. That way, they can jump to a particular item by typing a single number.

Other Open and Save shortcuts: if you have more than one disk on your desktop (whether floppy disks or hard drives), you can move between them by pressing Tab instead of clicking the Drive button. You can open a folder by selecting it and then pressing ⌘ along with the down-arrow key. You can close that folder by pressing ⌘–up arrow. And

(continues)

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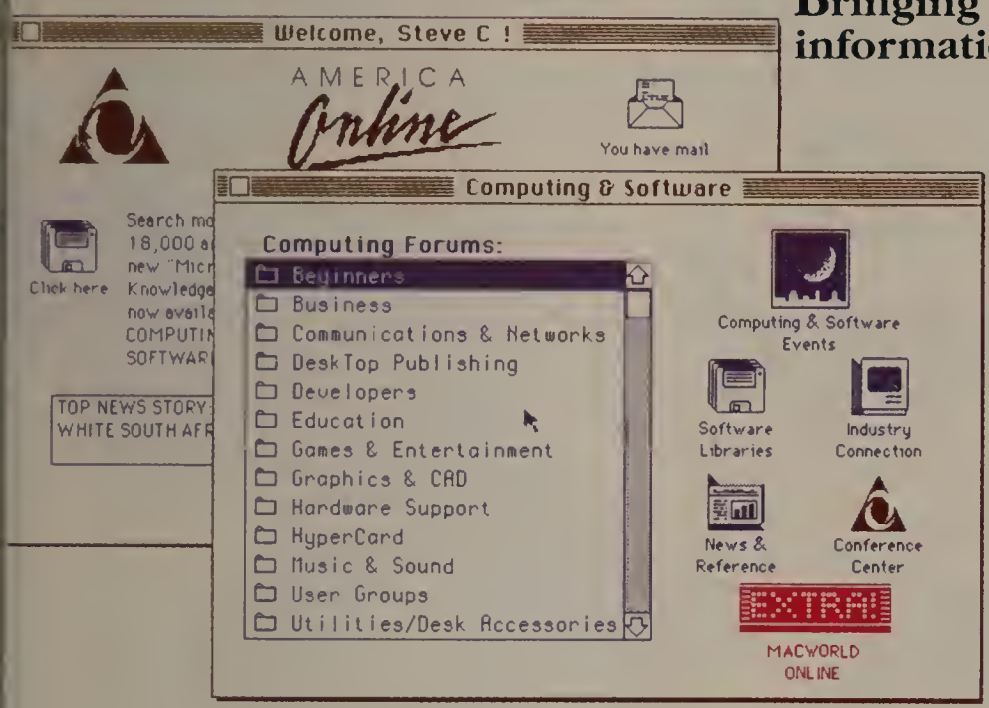

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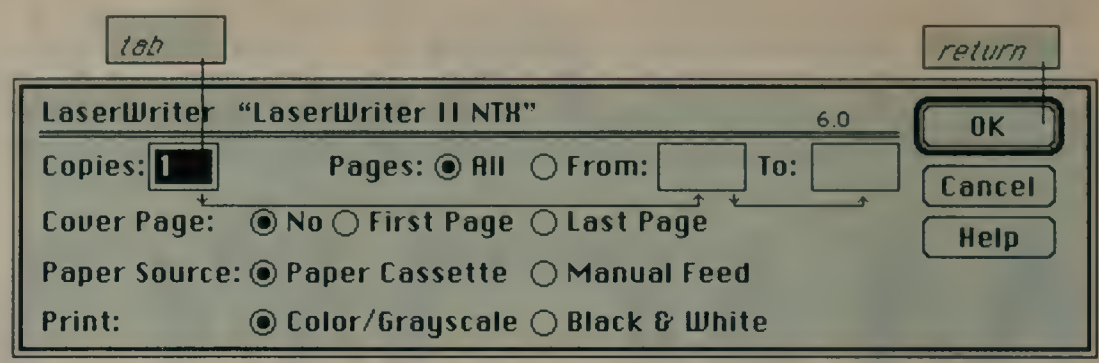

DIALOG BOX SHORTCUTS In dialog boxes with multiple text-entry boxes, pressing Tab moves the insertion point from one text box to the next. Pressing Return selects the bold-outlined button. To print a partial range of pages, you often don't need to type values in both the From and To boxes. For example, to print pages 1 through 5, type 5 in the To box and leave the From box blank. Similarly, to print from page 3 onward, type 3 in the From box and leave the To box blank.

you can cancel the Open or Save dialog box by pressing ⌘-period. (The latter key sequence also often cancels a time-consuming activity, such as printing.) Some people find these key sequences more cumbersome than using the mouse, but keyboard aficionados swear by them. It's another example of how the Mac lets you choose the navigation style that suits you.

Some shortcuts combine the keyboard and the mouse. *Shift-click* is a great way to select a large text passage: move the blinking insertion point to the beginning of the passage, then position it at the end of the passage, and hold down the Shift key while clicking. You can also use the Shift-click technique to select multiple icons at the Finder level.

Still other keyboard shortcuts use the Option key, either by itself or in combination with other keys. For example, if you have both an internal and an external hard drive, you can tell the Mac to start up from the external drive instead of the internal drive by pressing Shift-Option-Delete after switching on the Mac. (The external drive must contain a System Folder for this to work.) And pressing Option while choosing the Finder's Eject command (or while clicking the Eject button in an Open or Save dialog box) tells the Mac to eject the disk and remove its icon from the desktop—as if you dragged the disk's icon to the Trash.

Finally, remember that you can create your own keyboard shortcuts using a *macro* utility such as Apple's MacroMaker (included with the Mac) or the more powerful QuicKeys² from CE Software (see *Reviews*, this issue) and Tempo II from Affinity Microsystems (see "Getting Started with Utilities," *Macworld*, February 1990; for more navigation tips, see "Getting Started with Navigating," April 1988).

Get Your Versions Straight

You can't use the Mac without hearing occasional references to *version numbers*, those numbers that indicate a particular piece of software's stage of evolution. There are good reasons to know how to determine version numbers. When you call a dealer or software firm for technical assistance, you'll probably be asked which version of the Mac's system software you're using. When you buy a program, you'll want to be sure you're buying the latest version (current version numbers of hundreds of programs appear each month in *Macworld*'s *Updates* section). And you'll want to verify its compatibility with the version of the Mac's system software you use.

One way to determine a version number is to use the About command, which always appears first on the Apple menu. To learn the version number of your system software, for example, choose the About the Finder command. To learn the version number of an application program, start that program and choose its About command.

Another way to determine a program's version number is to use the Finder's Get Info command. Select the program's icon and choose Get Info from the Edit menu. (Or hone your keyboard skills and use the ⌘-I shortcut.) The file's version number appears in the Get Info window (see

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"What's Your Version Number?").

The Get Info command works for user-created documents, too. A document file doesn't have a version number to appear in the Get Info window, but you can use the text box at the bottom of the window to type descriptive information about the file (or to hold a few sentences from it, as mentioned earlier).

Hard Drive Organization Made Easy

If you have a hard drive (and you should—the Mac benefits from its speed and capacity), it's important to develop a sensible filing system for your programs and documents. You'll find things more easily, and you'll be able to back up your work more efficiently. And the Finder will perform faster, since it won't have to keep track of hundreds of files when you open a disk window or copy a file.

Organizing your hard drive involves using the Mac's folders to group applications and documents into logical categories. Use the Finder's New Folder command (in the File menu) to create a new (empty) folder, then give it a name such as Documents, Proposals, or Graphics Programs—whatever best describes its contents. At this point, you can open the new folder and follow the same process to create another folder inside it—just as you can nest one manila folder within another. This lets you develop a storage hierarchy that keeps your files orderly. You can nest folders more than a dozen levels deep, but navigating through more than five levels or so becomes cumbersome and time-consuming.

Some people create date-oriented folders—January Work, February Work, March Work, and so on—and then create folders within them for specific types of documents—memos, publications, artwork. Others create 26 folders, one for each letter of the alphabet, and file documents within them. You'll find a sample filing scheme in "Organizing a Hard Drive." It's just a starting point, though—the best filing system is one you've personalized for your work style.

Even with an efficient filing system, you may occasionally misplace a file. When you do, use the Mac's Find File DA to locate it. For faster and more powerful searching, consider On Technology's OnLocation or the Norton Utilities for the Macintosh, whose Fast Find DA is faster and offers more searching options than Find File. You'll also find file-searching features in GE Software's DiskTop and Electronic Arts' DiskTools II, DAs that perform Finder-like functions such as copying and deleting files, creating folders, and launching programs.

Other Stops on the Road to Mastery

Familiarizing yourself with the concepts, shortcuts, and commands I've presented here will take you a long way toward mastering your Mac. Here are a few more suggestions:

- Read those manuals. Many advanced

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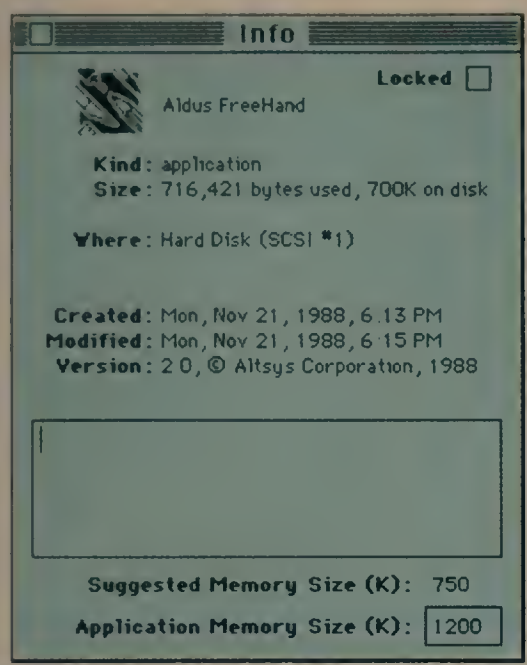
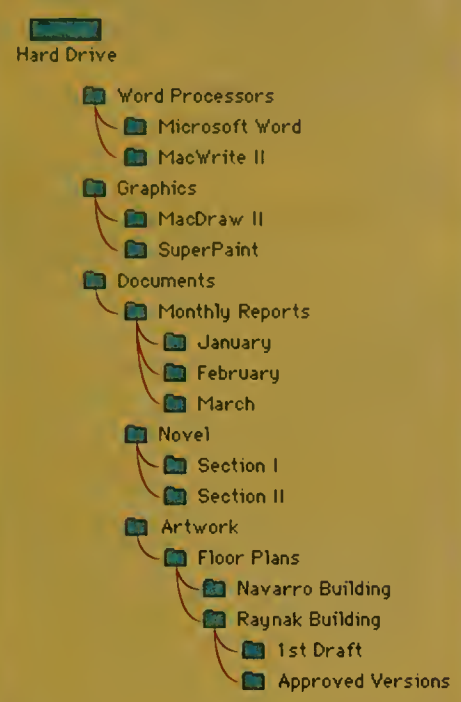


WHAT'S YOUR VERSION NUMBER? Choosing the Finder's Get Info command displays statistics about the selected application or document, a check box for locking the file to prevent modification or deletion, a text box that can contain descriptive text, and the program's memory requirements. By boosting the Application Memory Size you can often improve a program's performance. Lowering the value can allow it to squeeze more programs into memory.

Organizing a Hard Drive



Extensive use of folders improves the Finder's performance and keeps better track of files. In this filing scheme, each application category (word processor, graphics, and so on) resides in its own folder. Another folder holds all documents, separated into related category folders. Not shown is the System Folder, which contains files the Macintosh needs to start up and run.

Mac users brag that they never crack a manual—even when learning a new program. Nonetheless, every program has its subtle points, and you're unlikely to find them unless you read, or at least browse, the manual.

- Register your software. Registered owners are eligible for technical support and are notified of new versions. Many companies offer newsletters containing tips and insights on their products and some also operate customer support forums on communications services such as CompuServe and America Online (see "Getting Started with Communications," *Macworld*, May 1990).
- Join a user group. They're among the best sources of information, assistance, and freeware and shareware. To find a Mac user group near you, call 800 538-9696, ext. 500.
- Read. A few information-packed Mac titles include *Encyclopedia Macintosh* by Craig Danuloff and Deke McClelland (Sybex, 1990); *Amazing Mac Facts* by my colleague Lon Poole (January 1991, Microsoft Press); and, ahem, *Inside the Apple Macintosh* by yours truly and Peter Norton (Brady, 1989).
- Experiment with your programs and desk accessories and with the Finder's many commands and options. Customize your Mac using the Control Panel and the Font/DA Mover utility. You'll become more adept at using the Mac's interface, you'll develop a better understanding of how the Mac works, and you'll be able to tailor your Mac to suit your tastes.

Remember, it isn't power that makes a Mac expert—it's knowledge, experience, and perseverance. You're on your way to attaining that expertise. More power to you. ■

See *Where to Buy* for contact information.

Jim Heid is a contributing editor of Macworld. *He is currently working on a complete guide to the Mac, to be published next year by IDG Books Worldwide.*

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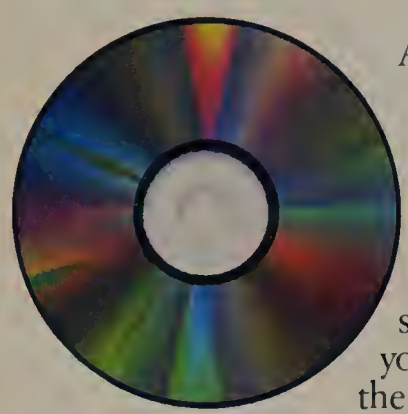

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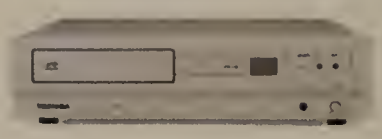

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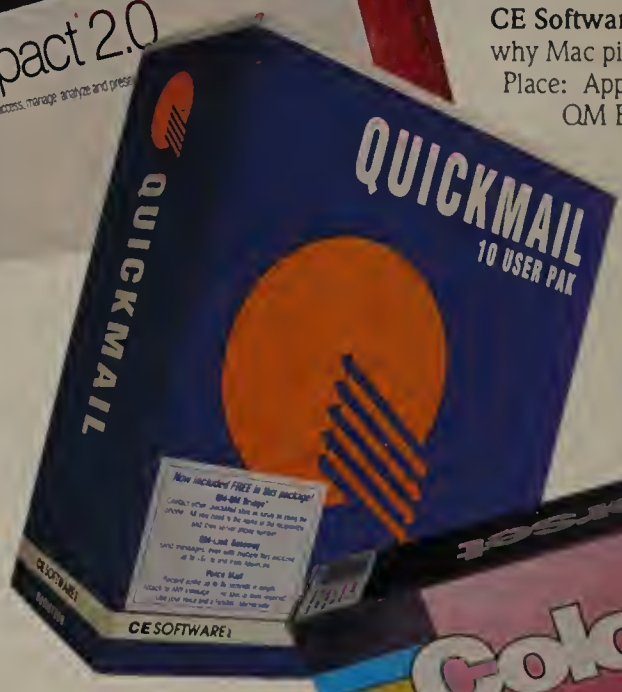

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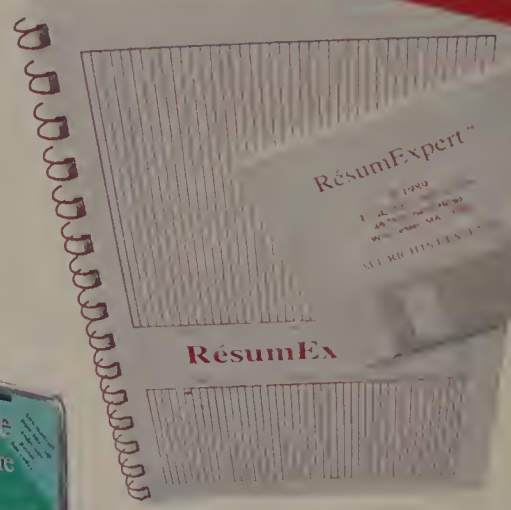

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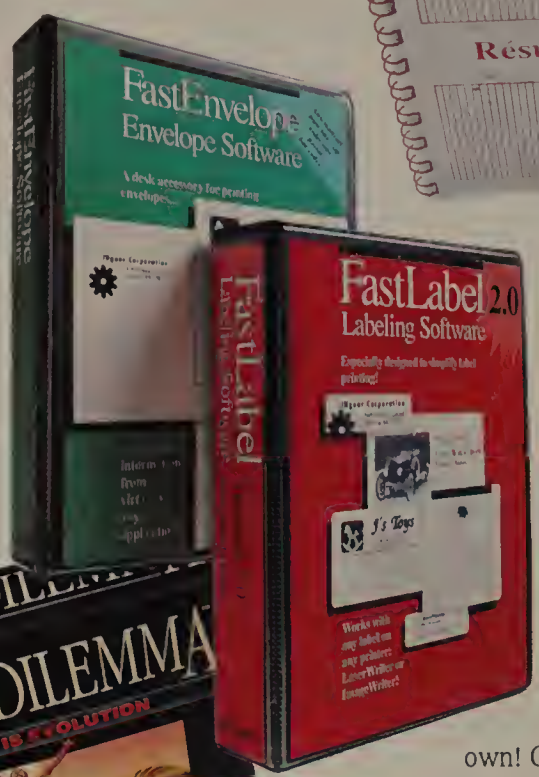

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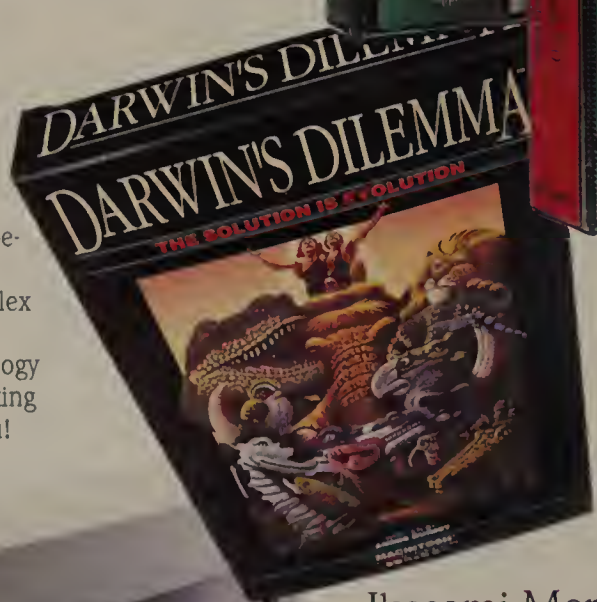

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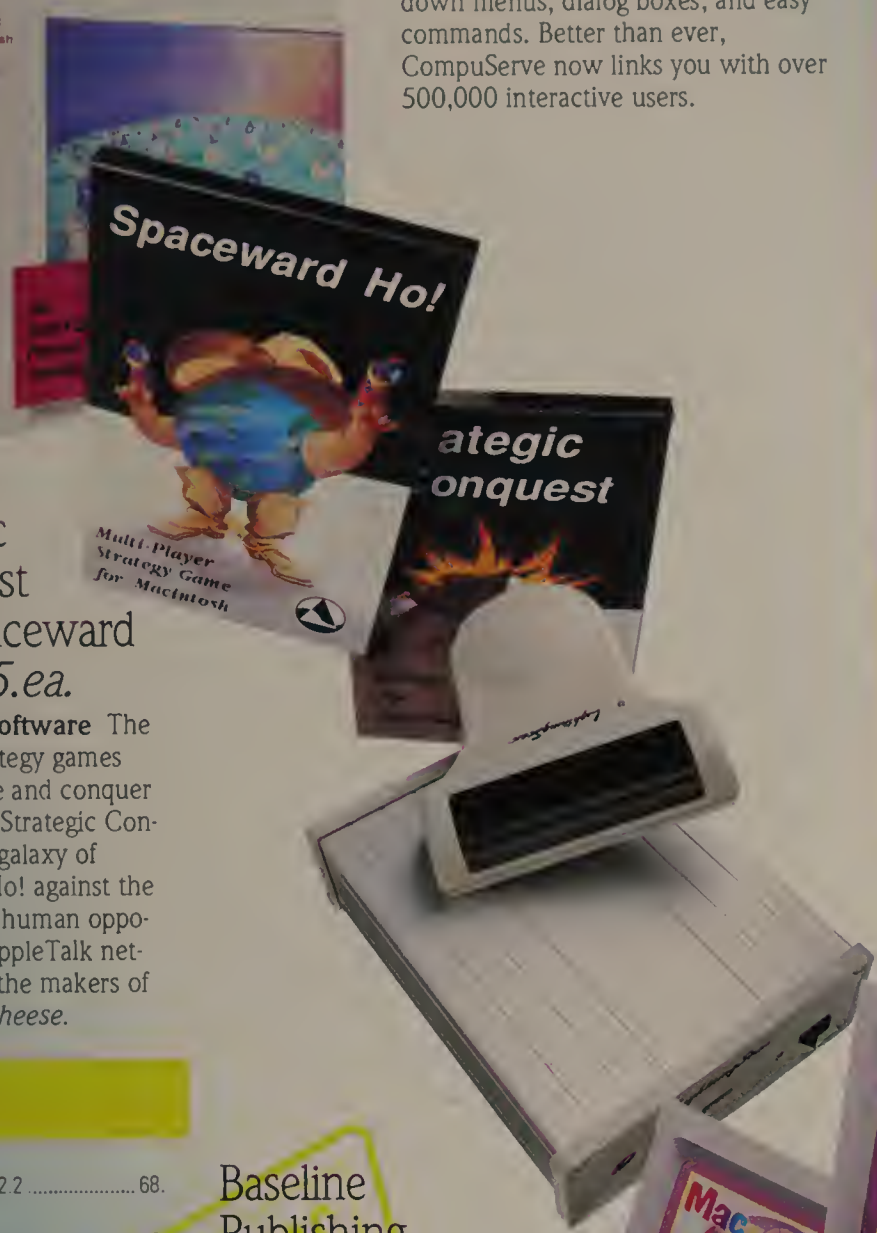

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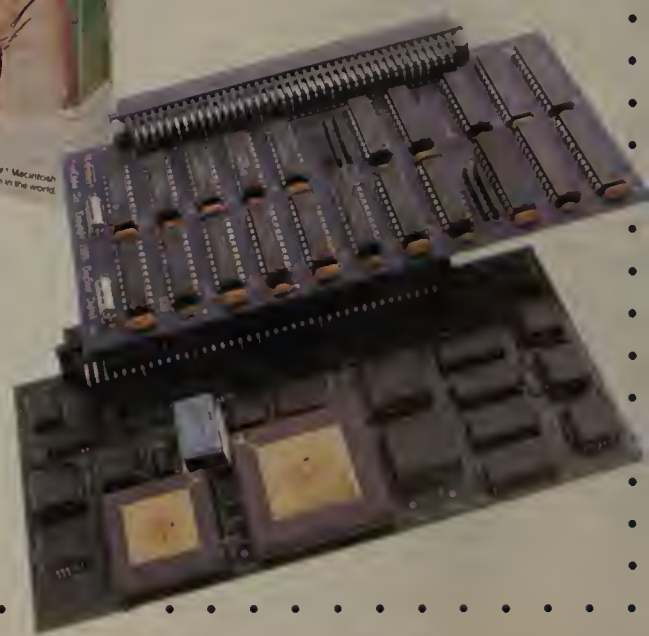

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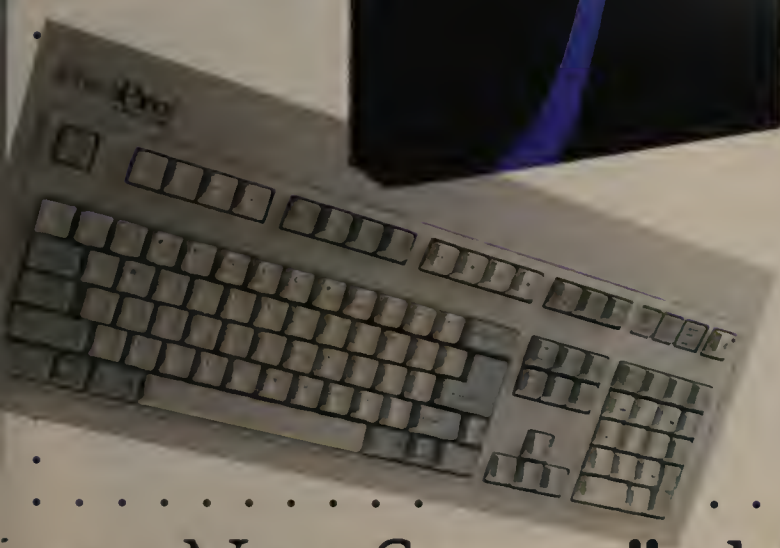

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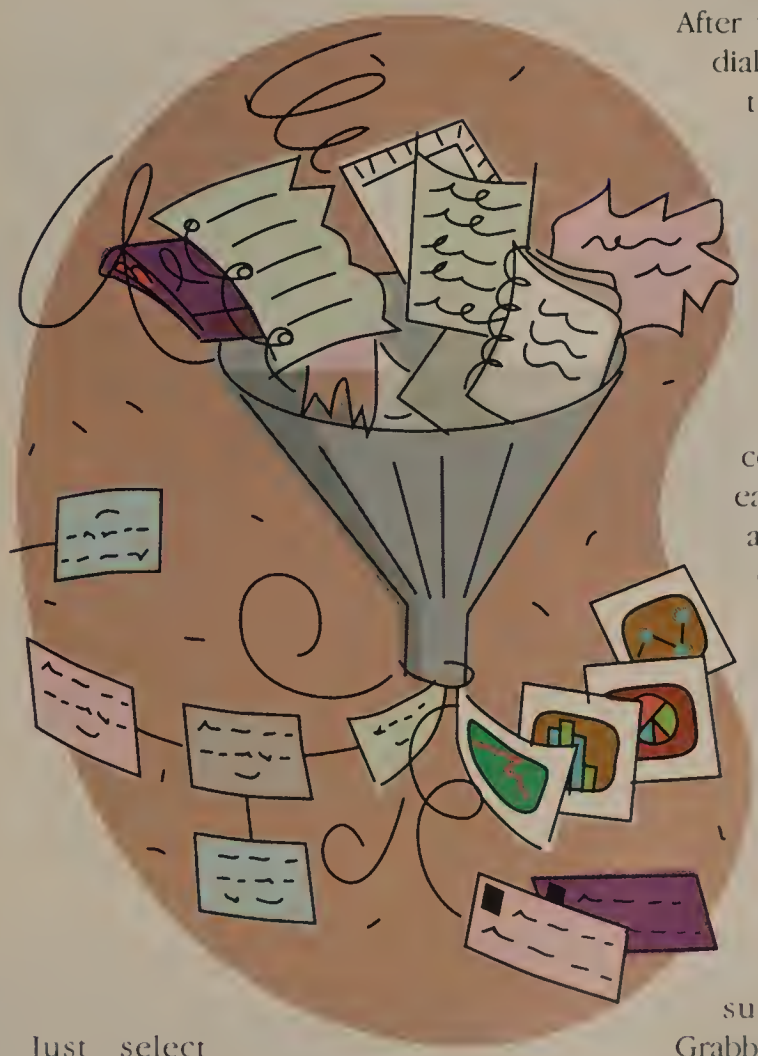
Insights on More 3.0

MAKING THE MOST OF THIS VERSATILE OUTLINE-TO-PRESENTATION PACKAGE

BY CHARLES SEITER

"Yeah, that's what I wanted. I wanted MORE!" Edward G. Robinson, hit with more bullets than a seven-point marketing chart, admits to Humphrey Bogart in the final scene of *Key Largo,* and tens of thousands of Mac users apparently agree. More has been a consistent best-seller in the Macintosh business world. From plain beginnings as an outliner and idea-organizer, it has now emerged—as More 3.0—into a complete idea-management system that can take you from notes on the back of an envelope to a boardroom presentation. More automates the production of slides and overheads, coordinates them with an outline, provides for fast modification of idea sequences, and offers a built-in MacWrite-style word processor.

I would like to acknowledge Kelly Garcia, of Symantec technical support, for her help in gathering these hints, tips, and shortcuts for using More 3.0.



Formatting Formalities

If you want to make headers or footers skip the first page of a presentation, you may have searched in vain for a Skip First Page command. The trick is to choose Headers & Footers from the Format menu; the Reorg menu (at the end of the menu bar) is then replaced by the Headers menu, which contains that command.

Following the Rules

In More 3.0, an outline's *rule set* is its complete set of text-formatting instructions. Let's say you've done some special formatting to come up with a distinctive headline style that you'd like to reuse in another outline. Just select the headline and press Option-⌘-C to copy the formatting rules and Option-⌘-V to apply the rules to a new headline (see "Reusing Rules").

Refining Your Palette

Sometimes you may want to match a color—for a background or a distinctive logo—that you have seen in a graphics file imported into More. To get this kind of custom color (or gray-scale shade) into the More color palette, you use the eye-dropper cursor. Select Custom Pattern by clicking and holding down the mouse button on the Background Patterns area in the graphics tool set (Bullet Chart view).

After the Custom Pattern editor dialog box appears, hold down the Option key and move the cursor outside the dialog box area—the cursor becomes an eye-dropper. Click when the eye-dropper is over the color you want to select, and then position the eyedropper over one of the colors in the Pure Colors area of the dialog box and click again. The new color becomes part of your standard More color palette.

Precise Positioning

As it automatically makes bullet charts from outlines, More 3.0 does a good job of positioning chart elements; but you may want to adjust their positions to suit your own aesthetics.

Grabbing a selected object with the pointer and moving it around is inadequate for fine positioning. You can nudge a selected object exactly 1 pixel per click in any direction by holding down the Option key and pressing the appropriate arrow key. If you want to quickly reposition an object by larger increments and you know exactly how far you want to

(continues)

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MORE OPTIONS

Of the vast number of More keyboard shortcuts, these Option-key sequences are probably the ones you'll find yourself using the most.

Option-Key Sequence	Function
Option-⌘-C	Copy headline formatting
Option-⌘-V	Apply headline formatting
Option–arrow key	Nudge selected element 1 pixel in Bullet Chart view
Option–double-click	Collapse/expand nodes in Tree Chart view
Option-⌘-A	Select all text at a given level in Outline or Tree Chart view
Option-⌘-period	Collapse outline in Outline or Tree Chart view
Option-⌘-S	Save all open files
Option-⌘-W	Close all open files

move it, double-click on the object in Bullet Chart view and answer the questions in the resulting dialog box.

Decorating Tree Charts

You can produce some nice effects using graphics in a tree chart, but remember—More accepts graphics in Tree Chart view only if they're placed in a headline-level box within the outline that defines the chart.

One More Is Enough

If you install More 3.0 while More II is still on your hard drive, the System won't recognize your More 3.0 documents (they'll appear as generic icons). To avoid this, remove More II and the mover utility from the hard drive and rebuild the desktop (hold down the Option and ⌘ keys while you restart).

More II files, when first opened up in More 3.0, will show rule-structure symbols on every headline (they indicate bullet-chart rules brought over from More II). To get rid of these symbols, reformat the outline by applying the default bullet rules for 3.0 (you'll find them in the Rule Sets submenu under the Library menu).

Collapsing Subheads

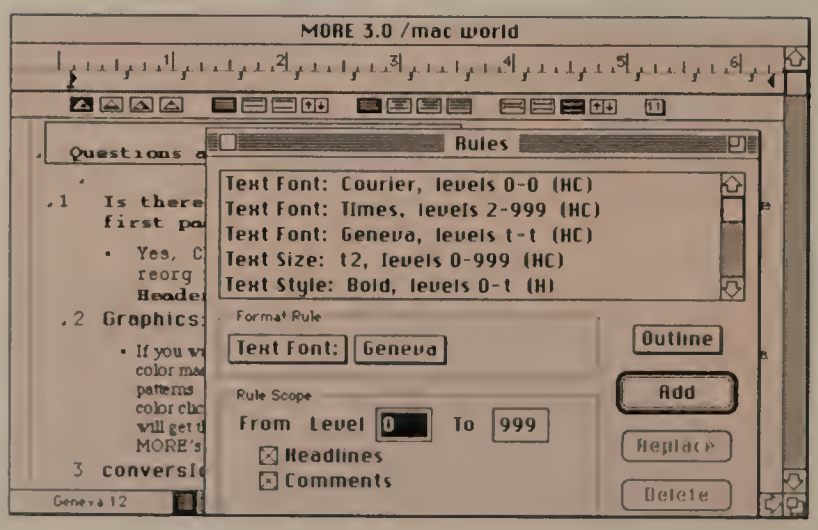
In Tree Chart view you can collapse outline subheads subordinate to a selected parent. Click on the parent node to select it, then hold down the Option key and double-click.

The Big Picture

Selecting text in an outline by level is a quick and easy way to format all level-1 text in one font and all level-2 text in another. Press Option-⌘-A to get a dialog box that lets you select one or more levels of an outline (see "Selecting by Level").

Another speed trick is Option-⌘-period (.), which toggles between expanded and collapsed views of an outline (this is particularly worthwhile in the global picture available in Tree Chart view).

(continues)



REUSING RULES
You can copy a rule (format specification) that's attached to a headline from one document to another using Option-⌘-C for copy and Option-⌘-V for paste. The rules from level 0 to 1, shown here in the Rules dialog box, are for headlines.

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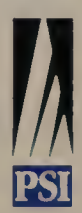

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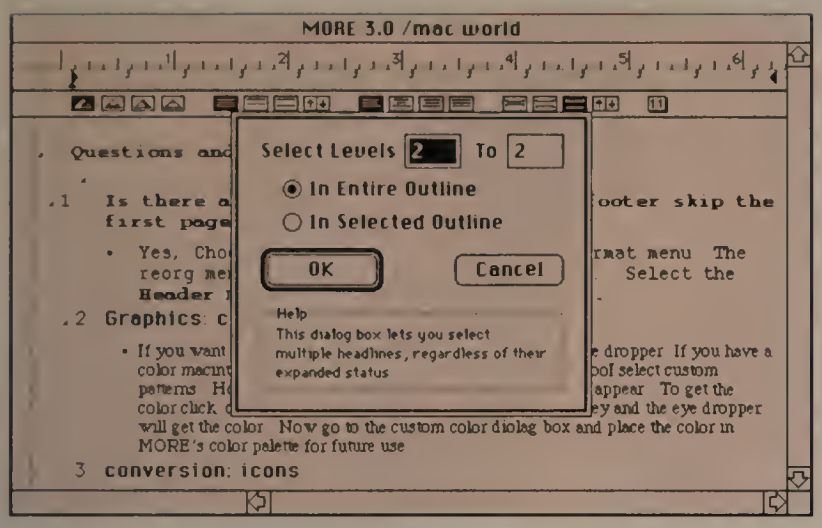
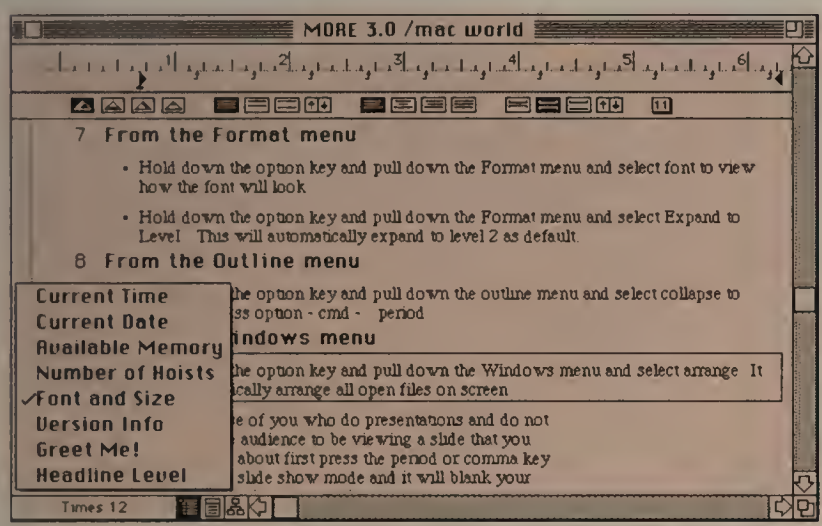


SELECTING BY LEVEL
The key combination Option-⌘-A immediately brings up this dialog box, which lets you select all text at a given level in an outline, for formatting or some other manipulation.



TRACKING FONTS
The Status Box is the fastest way to check your working level in the middle of a large outline or to keep track (as shown here) of More's font choices in bullet and tree charts.

More about Fonts

One of More's nicest amenities is the little information box in the lower-left-hand corner of the View window. Because More makes up bullet charts and tree charts from an outline according to its own rules (for example, you specify the font, and More determines the size), you may want to leave font and size data displayed in the information box (see "Tracking Fonts"). So, when you inspect the bullet charts More has created, you'll be able to see whether the charts will print in a font-and-size combination that's in your System file.

Quitting Time

You can save or close all open files, not just the files currently in view, by holding down the Option key and pressing ⌘-S for save or ⌘-W for close.

Speaker's Bureau

If you are doing a presentation in Slide Show mode and don't want the audience to view the next slide before you have a chance to discuss it, hold down either the period or the comma key. This blanks the screen until you are ready to show the slide.

You may to want to flip between Hide Invisibles and Show Invisibles, since the main invisible material in a More presentation consists of notes you make to yourself. The fast way to do this (you won't want to crawl through dialog boxes during a presentation) is with Option-⌘-Y.

If you've added notes to an outline, you might not be able to find them when you look over the presentation in Bullet Chart view. That's because notes attached to a subhead are visible in Outline view only; they appear in bullet charts only if they're attached to a title.

Sharing the Wealth

If you've found a tip or shortcut not mentioned here, spread the word to other readers by sending it to *Quick Tips, Macworld,* 501 Second St., San Francisco, CA 94107. ◻

See *Where to Buy* for contact information.

Charles Seiter is a Macworld *contributing editor who uses More 3.0 for designing training classes in biotechnology and computing.*

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INFO WORLD

UPDATES

Here's our list of some of the latest versions of Mac software that were announced at the time we went to press. We hope you'll find it useful—because these days, keeping track of the latest CPU is tough enough.

Address Book version 2.0 has improved search and sort; adds data entry fields for suffix, department, fourth phone number, phone codes; and has a notes area. Includes expanded dialing preferences, faster entry modification, and postal bar coding. Power Up, 403/463-3330. $25 upgrade; $179.95 new.

EndNote Plus includes QuickFind feature to make finding records easier, does case-sensitive Boolean searches, finds duplicate records, contains a glossary of journal abbreviations, contains a printing and text menu, and enables you to sort a database on up to five fields and to set each to ascending or descending order. Niles & Associates, 415/655-6666. $49 upgrade; $249 new.

Now Utilities version 2.0 consists of 12 utilities. New additions include the MultiMaster application launcher, with a pull-down menu and pop-up window that indicates amount of available RAM while running an application; a version of Super Boomerang, which displays recently used files and applications; and Screen Locker password-protection system with screen savers. Now Software, 503/274-0670, 800/327-3611. $25 upgrade; $129 new.

P51 Mustang Flight Simulator version 2.80 is now compatible with the Mac II, Mac IIx, and Mac SE/30. Bullseye Software, 702/265-2298. $10 upgrade; $59.95 new.

PRODUCT UPDATES

Product	V.	Req.	Rev.	Price
1st Aid Kit ★	2.8	512KE/3.0		*
4th Dimension	2.1	1MB/6.02	3/90	Free
Aatrix CheckWriter II ★	2.01	512K/4.1		$10
Aatrix TimeCard	2.0	512K/4.2		Free
Accountant Inc., Pro	1.03	1MB/6.03	9/90	$19.95
ACCPAC Bedford	1.1	1MB/5.1		$50
Simply Accounting				
AccuText	2.0	4MB/6.02	2/90	*
Address Book	**2.0**	**1MB/6.02**	**6/90**	**$25**
Adobe Illustrator	**3.0**	**2MB/6.03**		*
Adobe Type Manager ★	2.0	1MB/6.02	2/90	Free
AdWriter	2.0	1MB/6.0		Free
After Dark	2.0	512KE/4.1	7/90	*
Alchemy	1.1	1MB/6.0	10/90	$25
Aldus FreeHand	2.02	1MB/6.03		*
Aldus PegeMaker	4.0	1MB/4.1	9/90	$150
Aldus Persuasion	2.0	1MB/6.0		*
AmPack Plus ★	4.2.2	512K/3.2		$29.95
Anelog Connection	3.0	1MB/5.0	5/90	$50
WorkBench				
Anatool ★	3.1	512K/3.0		$35
AntiToxin	1.3	1MB/6.0.2		$15
Aperture	1.7	2MB/6.0.3	7/90	*
APL 68000	7.0	512K/3.2		*
AppleShere File Server	2.0	512K/3.2		*
ArchiText	2.0	1MB/6.02		Free
Aristotle's Politics	2.0	2MB/6.03		Free
The Art Importer	2.0	1MB/6.0	5/90	$20
ArtRoom	3.0	512K/3.2		$199
AutoCalc	2.0	1MB/6.0		$95
AutoSave II	1.1	512KE/4.2	7/90	$7.50
A/UX	2.0	4MB/6.0.5		*
Aztec C	3.6	512KE/4.2		*
BeckFax ★	1.02	1MB/6.03		Free
Back to Basics	2.0	512K/3.2		$75
Professional				
Bridge	6.0	512K/3.2		$17
Business FileVision ★	1.5	1MB/6.02		*

Product	V.	Req.	Rev.	Price
Business Sense ★	1.2	1MB/6.0		*
Business Session ★	3.2	512K/3.2		Free
CA-Cricket Presents	2.0.1	1MB/6.0		*
Calculator	2.06	512K/3.2	4/90	$25
Construction Set ★				
CanDpener	1.1	512K/3.0		Free
Canvas	2.1	1MB/6.0		*
Capture	3.0	1MB/6.0	2/90	$15
Central System Manager	2.1	1MB/5.0x		*
Chameleon	3.0	512K/3.2		Free
Chemintosh II		**1MB/6.02**		**Free**
ChromaScan	1.1	4MB/6.02		Free
Claris CAD	2.0	2MB/6.0		$79
Codecheck	2.0	1MB/6.0		Free
Colorset ★	1.5	1MB/6.0	6/90	Free
CompileIt	1.5	1MB/6.02	3/90	$30
CompuServe Navigator ★	2.1	512K/3.2		*
Computerized	2.2	1MB/6.0		*
Classic Accounting				
ConcertWare	5.1	512KE/4.2		$35
Control II	1.1	2MB/6.04		Free
CopyFlow	2.0	2MB/6.0	6/90	Free
Cue	3.0	1MB/6.03		*
DacEasy Light	2.0	1MB/6.03		*
Checkbook Accounting				
Deta Desk	3.0	512K/4.02	6/90	$125
DeteMerge	2.0	512K/3.2		Free
dBase Mec ★	1.01	1MB/4.1		Free
Deluxe Music	2.5	512K/6.02		*
Construction Set				
DeskPeint ★	3.0	1MB/4.2	5/90	Free
Developer Steck	3.0	1MB/6.0		$15
DiagramMaker ★	1.1	1MB/6.02		*
Digital Derkroom	1.1	1MB/6.02		Free
DiskDoubler	2.0	1MB/6.02		*
DiskExpress II	2.04	1MB/6.0	11/90	*
DiskFit	1.5	512K/4.1		$30
DiskTop	4.0	1MB/6.0		*

Product	V.	Req.	Rev.	Price
Display AdBuilder	1.1	1MB/6.03		*
DocuComp	1.5	512K/3.0	12/90	$19.95
Dollars and Sense	4.1	512KE/3.2		*
Double Helix	**3.5**	**1MB/6.0**		*
Dreams	1.1	1MB/6.02		*
DynaPerspective	2.0	2MB/6.04		Free
DynoDex ★	1.21	1MB/6.0	6/90	Free
Easy Color Paint	1.1	1MB/6.0	9/90	*
Empower II ★	3.03	1MB/4.2		Free
EndLink	1.1	512K/3.2		Free
EndNote Plus		512KE/3.2		$49
Exodus	2.0	1MB/6.0		$50
Extender GrafPak	3.0	1MB/6.02		$30
Falcon	2.2	1MB/3.2		$3
Fastback II	2.1	512KE/4.1		$30
Fast Forms	2.0	512K/3.2	11/90	$25
FastLabel	2.0	1MB/6.0		$36
FastTrack	1.5	512KE/5.5		$20
FaxGete ★	1.02	1MB/6.0		Free
Ferrari Grand Prix ★	1.6	512K/3.2		$10
Fetchit	2.0	512K/6.01		*
FileMaker II ★	1.1	1MB/4.2		*
Filevision IV	**1.1**	**1MB/4.2**		**$15**
FilmMaker	2.0	5MB/6.0.3		*
Finale	2.01	1MB/6.02	5/90	$5
Financial Analysis	3.0	512K/3.0		*
Findswell	2.01	512KE/3.2	3/90	*
Fontographer	3.1	1MB/4.2	5/90	*
FontShare	2.0	1MB/6.0		Free
FormsProgrammer ★	2.03	1MB/6.02		$15
FoxBase+/Mac ★	2.10	1MB/6.0		$75
Freedom of Press ★	2.2	1MB/6.0		Free
FreeFlow	3.0	1MB/6.03		Free
Full Impact ★	2.0	1MB/6.0		$50
FullWrite Professional	1.5	2MB/6.02		*
Gamblin' Times	3.0	1MB/6.0		$10
GatorBox	1.5	NA		Free

(continues)

Bold = *first time the product is being listed*

★ = *minor update*

Req. = *min. RAM and system software required*

Rev. = *last time (in past year) reviewed this or an earlier version*

Price = *cost for update to registered owners*

* = *contact your dealer for update policy*

PRODUCT UPDATES

Product	V.	Req.	Rev.	Price
GeoQuery	2.0	1MB/6.0	10/90	*
Gofer	2.0	1MB/4.1		$25
GQL	2.0	1MB/5.0		*
Grammatik Mac	2.0	1MB/5.0	9/90	Free
Great Gantt	1.2	1MB/6.0	12/90	Free
Great Plains Accounting Series	5.2	1MB/6.0		*
HandOff	1.2	1MB/6.0	4/90	*
Handwriting Analyst ★	3.1	512K/3.2		$24.95
Hard Disk Partition	3.02	1MB/6.0		$30
Hard Disk Util	3.0	1MB/6.0		$65
Help DA	3.0	1MB/6.0		Free
HFS Backup	3.0	512K/3.2		$35
HydroMac	2.0	1MB/6.0		*
HyperAnimator ★	1.5	1MB/6.03		$29.95
HyperCard ★	2.0	1MB/6.03		$49
HyperDA ★	1.2	512K/3.2		$10
HyperEngine Developer's Tool ★	1.1	1MB/6.03		Free
HyperLibrary	2.0	1MB/5.0		*
HyperPort Chess	2.0	1MB/6.0		$10
HyperTools	2.0	2MB/6.02		$20
HyperWindows ★	1.2	1MB/6.02		$20
Iconia ★	7.0	1MB/6.0		*
Icon-It	2.0	1MB/6.02	9/90	$29
Igor ★	1.1	1MB/6.0	5/90	Free
Image Grebber	2.0	1MB/6.02		Free
ImageStudio	1.5	1MB/6.0		$99
ImageWriter LQ Print Driver ★	2.0	512K/3.2		Free
In-CAD	2.0	2MB/6.0		*
InfoLogic Envelope ★	1.1c	512KE/4.0		$5
Insight Expert Accounts Payable	2.2	1MB/6.0		*
Insight Expert Accounts Receivable	2.2	1MB/6.02		*
Insight Expert General Ledger	2.2	1MB/4.2		$99
Inspiration	2.0.5	1MB/4.2	11/90	Free
Instent-Expert Plus	3.0	1MB/5.0		Free
JetLink Express ★	1.01	1MB/6.0		Free
KidsTime ★	1.2	512K/3.2		$15
KiwiEnvelopes	3.0	512KE/4.1		$10
LanguegeSystems Fortran ★	2.1	1MB/6.03		*
LapLink Mac III	3.0	512K/2.0	7/90	*
LaserPaint Color II ★	1.02	1MB/6.03		Free
LetraStudio	1.5	2MB/6.0		$45
LetrTuck+	2.0	512K/3.2		$20
Lightspeed Color Layout System	2.0	1MB		*
Lookup	2.0	1MB/6.0	5/90	$15
Mac86	2.0	1MB/6.02		$10
Mac286	2.0	1MB/6.02		$10
Mac3270	2.0	1MB/6.03		*
MacAnalyst	2.0	2MB/6.0		$125
MacArchitrion	4.0	2MB/6.03		Free
MacAtlas Paint	2.0	512K/3.2		$35
MacClassAds	4.0	1MB/6.0		*
MacConcept	3.0	1MB/6.03		*
MacDesigner	3.0	2MB/6.0		$125
MacDraft	2.0	2MB/6.0.2	12/90	*
MacDraw II	1.1	1MB/6.0		*
MacEnvelope	5.0	512KE/3.2		$25
MacEnvelope Plus	2.0	512KE/3.2		$50
MacFalcon	2.1	1MB/6.03		*
MacFlow ★	3.1.5	1MB/6.03		Free
MacFortran	2.4	512K/4.2		*
MacFortran/020	2.4	512K/4.2		*

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Product	V.	Req.	Rev.	Price
MacFortran for MPW	1.1	2MB/6.02		Free
MacInUse	3.0	1MB/6.0		$30
MacLinkPlus/Weng VS	4.0	512KE/3.2		$45
MacLotto	2.1	512K/4.0		$10
MacMainFrame 3270/CUT	2.1	2.5MB/6.02		$100
MacMoney	3.5	512KE/4.0		$12
MacPhonebook	2.0	512KE/3.2		*
MacPrint	1.23	1MB /6.02		Free
MacProject II	2.1	1MB/6.0		Free
MacProof ★	3.2.1	1MB/6.02	2/90	$30
MacRascol	2.0	2MB/4.1		$25
MacRecorder	2.0	512K/3.2		*
MecroMind Director	2.0	2MB/6.02	10/90	$100
MacSafe II		512KE/4.2	10/90	*
MecScan	1.6	1MB/6.0		$35
MacSchedule	2.0	1MB/6.0		$30
MacSmarts	4.0	1MB/6.0		*
MacSpin	3.0	512K/4.2		$75
MacTell	3.5	512K/3.0		*
MacTerminal ★	2.31	512K/3.2		Free
MacToPic	2.0	1MB/6.0		$25
MacVision	3.0	1MB/6.0.2		$50
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Maple	4.2.1	1MB/6.0		*
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MarketMaster	II+	1MB/6.03		$25
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Mester Tracks Pro 4	4.12	1MB/4.1	6/90	$45
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MathType	2.1	512K/6.02		*
Matlab	1.2	1MB/3.0		*
MaxPage ★	1.2	512K/3.2		Free
McClint	2.0	1MB/4.2		$25
McCPrint	2.0	512K/4.2		$25
McMax	2.0	1MB/5.0		*
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And it's simplest because it connects more easily: It uses the SCSI interface that lets you plug directly into your Mac. What's more, its 24-bit, full-color digitizer gives you the highest possible resolution from any still video source.

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In sum, Canon's new FV-540 makes still video quite simple. For more facts, Mac, call 1-800-221-3333, ext. 313.

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For additional products not listed on this page, refer to the *The Macworld Catalog* section.

PRODUCT UPDATES

Product	V.	Req.	Rev.	Price
Navigate	2.0	1MB/6.0		Free
Nemesis Go Master	4.0	512K/4.1		*
Network DiskFit	1.5	512K/4.1		$30
The NightWatch ★	1.03	512KE/3.2		*
Nisus	3.0	1MB/6.02		Free
Now Utilities	2.0	1MB/6.02		$25
NuPaint ★	1.04	512K/3.2		Free
NuTools	1.2	1MB/6.0		*
Nutrition Stack	2.0	1MB/6.02		$20
OmniPage ★	2.1	1MB/6.02	2/90	Free
Omnis 3 Plus/Express	2.0	512KE/3.2		*
On Schedule	2.0	1MB/3.0		*
P51 Mustang Flight Simulator	2.80	512K/3.2		$10
PacerLink	5.0	512K/5.0		*
Panorama	1.5	1MB/4.2		$29.95
Paper Keyboard	1.2	2MB/6.03		$25
PEGASYS II	3.2	1MB/6.03		Free
Performer Sequencer	3.5	1MB/6.0		Free
Personal Golf Stats	2.0	512K/3.2	2/90	Free
Personal Phone ★	1.1	1MB/6.0		*
Personal Reference Catalog	2.0	1MB/6.0	10/90	$10
Phonenet Liaison	3.0	1MB/4.2		$75
PhotoMac	1.5	2MB/6.03		$75
PhotoMacEdit	1.5	2MB/6.03		$30
The Phrase Thesaurus	2.0	1MB/6.0		Free
PICT Detective	2.0	512KE/6.0		$20
PixelPaint	2.0	2MB/4.1		$99
PixelPaint Pro	2.0	3MB/6.0.3		$125
Plains & Simple ★	1.06	1MB/3.2		*
PostShow	1.1	1MB/6.0		$35
PowerDrew	3.0	1MB/6.0		*
PowerStation ★	2.5.2	512K/4.1		Free
PowerTools	3.0	4MB/6.0		*
Practica Musica	2.1	512K/3.2		$10
Printer Interface III	2.0	512K/6.02		$22.50
Pro-Cite ★	1.3	512K/4.1		*
Professional Composer	2.3	1MB/6.03		Free
Professional Image II	2.0	1MB/6.0		$22
The Programmer's Online Companion	2.0	1MB/6.02		$10
Prograph	2.0	2MB/6.0	8/90	*
Property Management III		1MB/6.0.1		$100
PropsForms	2.0	1MB/6.03		Free
Prototyper ★	2.01	1MB/4.1		$79
Publish It	1.2	512KE/5.0		*
Publish or Perish	5.0	512K/4.2		$10
Pyro	4.0	512K/4.1	7/90	$15
Q Sheet A/V	2.0	1MB/6.0	10/90	$50
QuarkXPress	3.0	2MB/6.0.5	11/90	$30
Quicken ★	1.5	512K/5.0		$30
QuicKeys	2.0	1MB/6.02	1/91	$49.95
QuickLetter	1.1	512KE/3.2		Free
QuickLock	2.0	512KE/3.2	10/90	Free
QuickMail	2.2	512KE/3.2		$95
QuickShare	2.0	512KE/3.2		$75
QuickShot ★	2.1	1MB/4.2		$5
RagTime 3	3.04	2MB/6.0	8/90	$150
Read-It OCR Personal	2.1	1MB/6.03		$29
Read-It OCR Professional	3.0	2MB/6.03		*
ReadySetGo	4.5	1MB/6.0		*
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Reports ★	1.2	1MB/6.0		Free
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Sales and Market Forecasting Toolkit	2.0	1MB/6.0		$49
Sales Associate	1.10	1MB/6.03		Free
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ScriptEdit	1.1	1MB/6.04	3/90	*
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Sentinel	2.2	1MB/6.0		$30
Shanghai	2.0	1MB/6.02	2/90	$13
Shortcut	1.5	1MB/6.0	3/90	Free
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SimpleSpan	2.5	512K/3.2		*
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Smart Alarms & Multi-User Appointment Diaries	3.01	1MB/6.02	12/90	*
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Still Light	3.0	1MB/6.0		Free
StrataVision 3d	2.0	2MB/6.03	4/90	$99
Suitcase II	1.2.6	512KE/4.1		$25
Super 30	2.1	512KE/6.02		Free
SuperANOVA	1.1	1MB/6.02	5/90	Free
SuperGlue II with GlueNotes	2.1	1MB/6.0		*
SuperLaserSpool	2.0.2	1MB/6.0		$30
SuperPaint	2.0	1MB/6.02		$50
SuperSpool	5.0	512K/4.1		$30
Sybil	2.0	1MB/6.0	11/90	*
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Tempo+ Tools ★	1.1	1MB/4.2		*
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UpBeat	2.01	1MB/6.0	8/90	$75
VersaCAD/ Macintosh Edition ★	2.11	1MB/6.0		Free
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Wingz ★	1.1	1MB/6.0		Free
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WordPerfect for the Macintosh	2.0	1MB/4.2		*
WorksPlus Command	2.0	2MB/6.03		$35
WorksPlus Spell	2.0	1MB/6.03		$35
WriteNow	2.2	512K/4.2	9/90	$49

To have products listed in this section, send upgraded software, an outline of changes since the previous release (indicate if it's a maintenance upgrade), upgrade price, minimum RAM and system software, suggested retail price, company name, mailing address, and phone number to *Updates, Macworld,* 501 Second St., San Francisco, CA 94107.

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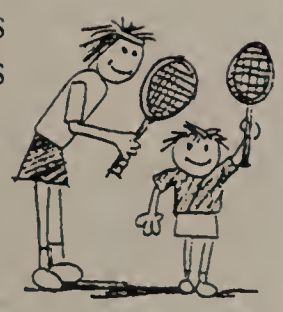

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60	Seagate	28	NA	38
80	Seagate	28	NA	43
80	Quantum*	19	499	54
105	Quantum*	19	559	62
105	Toshiba	20	549	61
180	Fujitsu*	25	NA	84
200	Maxtor	15	929	97
210	Quantum*	16	939	99
320(HH)	Micropolis	14	NA	144
320(FH)	Imprimis	16	NA	144
600(FH)	Imprimis	16	NA	185
630(FH)	Fujitsu	16	NA	194
660(FH)	Micropolis	16	NA	209
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WHERE TO BUY

A Guide to Products Featured in This Issue

This listing provides companies and phone numbers for products mentioned in this issue. Allow several weeks for responses to reader service card inquiries. Asterisks indicate vendors who prefer to be contacted by phone.

Reader Service

24-Bit Display Systems

701 Apple Computer; 408/996-1010.
702 E-Machines; 503/646-6699, 800/344-7274.
703 Generation X Technologies; 408/739-4570, 800/448-8231.
704 MegaGraphics; 805/484-3799, 800/487-6342.
705 PCPC; 813/884-3092.
706 Radius; 408/434-1010, 800/227-2795.
707 RasterOps Corp.; 408/562-4200, 800/468-7600.
708 Sigma Designs; 415/770-0100, 800/933-9945.
709 SuperMac Technology; 408/245-2202.

A

710 **Adobe Photoshop** Adobe Systems; 415/961-4400, 800/833-6687.
711 **Afternoon, a story** Eastgate Systems; 617/924-9044, 800/562-1638.
712 **AgreeMentor** Jian; 415/941-9191, 800/442-7373.
713 **Aldus PrePrint** Aldus Corp.; 206/628-2320.
714 **Amazing Paint** CE Software, 515/224-1995.
715 **ArcImage** First Financial Technology; 213/541-9446.
716 **Ask It** True Basic; 603/298-8517, 800/872-2742.

C

718 **C-Cube CL550** C-Cube Microsystems; 408/944-6300.
719 **ColorCard/24** SuperMac Technology; 408/245-2202.
720 **Colorsqueeze** Eastman Kodak; 716/724-4000.
721 **ColorStudio** Letraset Graphic Design Software; 201/845-6100, 800/343-8973.
Compactor Shareware by Bill Goodman; 109 Davis Ave., Brookline, MA 02146.
722 **Compression Master** C-Cube Microsystems; 408/944-6300.
723 **Compression Workshop** C-Cube Microsystems; 408/944-6300.

D

724 **Darwin's Dilemma** Inline Design; 203/364-0063.
725 **Deck** Digidesign; 415/688-0600, 800/333-2137.
726 **Desk** Zedcor; 602/881-8101, 800/482-4567.
727 **DirectColor/GX** Radius; 408/434-1010, 800/227-2795.
728 **DiskDoubler** Salient Software; 415/321-5375.
729 **DiskDoubler Developer's Kit** Salient Software; 415/321-5375.
730 **DiskTools Plus** Electronic Arts; 415/571-7171, 800/245-4525.
731 **DiskTop** CE Software; 515/224-1995.

E

732 **Ecomp** Electronics for Imaging; 415/742-3400.
733 **EtherPrint** Dayna Communications; 801/531-0203.

F

734 **FastTrax** Du Pont Electronics; 302/774-1000, 800/237-2374.
735 **FlexScan 9060S** Nanao USA Corp.; 213/325-5202.
736 **FrameMaker** Frame Technology; 408/433-3311, 800/843-7263.

G

737 **Graphics Accelerator** SuperMac Technology; 408/245-2202.

H

738 **Hurdler CER** Creative Solutions; 301/984-0262, 800/367-8465.
739 **HyperSnoop** SPE Software; 619/967-8219, 800/350-8219.

I

740 **Image Grabber** Sabastian Software; 206/861-0602.

M

741 **Macintosh Display Card 8•24 GC** Apple Computer; 408/996-1010.
742 **MacProteus** Digidesign; 415/688-0600, 800/333-2137.
743 **MacRenderMan** Pixar; 415/236-4000, 800/937-4927.
744 **MacTools Deluxe** Central Point Software; 503/690-8090, 800/888-8199.
745 **The Mathematics Teacher's Workstation** Sterling Swift Software; 512/280-2431.
746 **MD Mars** Micro Dynamics; 301/948-4616.
747 **MediaTracks** Farallon Computing; 415/596-9100.
• **MegaPixel Color Display** Next; 415/366-0900.
• **MegaPixel Display** Next; 415/366-0900.
749 **More** Symantec Corp.; 408/253-9600, 800/441-7234.
750 **MultiClip** Olduvai Corp., 305/665-4665, 800/822-0772.

N

751 **Neotech Image Compressor** Advent Computer Products; 619/942-8456.
• **Next 400 dpi Laser Printer** Next; 415/366-0900.
• **Nextcube** Next; 415/366-0900.
• **Nextdimension Board** Next; 415/366-0900.
• **Nextstation** Next; 415/366-0900.
• **Nextstation Color** Next; 415/366-0900.
752 **Norton Utilities for the Macintosh** Peter Norton Computing; 213/453-2361, 800/365-1010.

P

753 **PicturePress Accelerator** Storm Technology; 415/322-0506.
754 **Point of View** Scholastic; 800/541-5513.

Q

756 **QuickColor Graphics Engine** Radius; 408/434-1010, 800/227-2795.
757 **QuicKeys²** CE Software; 515/224-1995.

R

758 **RasterOps 24L** RasterOps Corp.; 408/562-4200, 800/468-7600.
759 **RasterOps 24S** RasterOps Corp.; 408/562-4200, 800/468-7600.
760 **RasterOps Accelerator** RasterOps Corp.; 408/562-4200, 800/468-7600.
761 **Report Ideas** Intelligence Active Software; 309/833-5959, 800/344-0571

S

762 **Screenshot** Preferred Publishers, 901/683-3383

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764 SmartScrap Solutions; 802/865-9220.

765 Spectrum/24 PDQ SuperMac Technology; 408/245-2202.

766 Spectrum/24 Series III SuperMac Technology; 408/245-2202.

767 StuffIt Classic Aladdin Systems; 408/685-9175.

768 StuffIt Deluxe Aladdin Systems; 408/685-9175.

769 StuffIt Engine Developer Kit Aladdin Systems; 408/685-9175.

770 SuperSqueeze SuperMac Technology; 408/245-2202.

T

771 TCP/Connect II Intercon Systems Corp.; 703/709-9890.

772 Tempo II Affinity Microsystems; 303/442-4840, 800/367-6771.

Reader Service

773 TrakHur Hurricane Research Service; 512/836-7888.

V

774 Visualink CSX Technology; 904/359-3443.

W

775 Wacom SD-420L Digitizer Wacom; 201/265-4226, 800/922-6635.

776 Where in Time Is Carmen Sandiego? Broderbund Software; 415/492-3200, 800/521-6263. M

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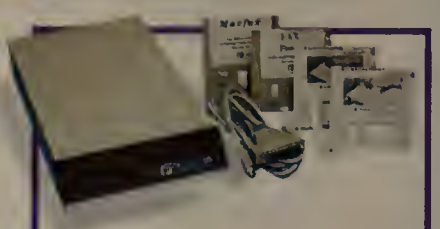

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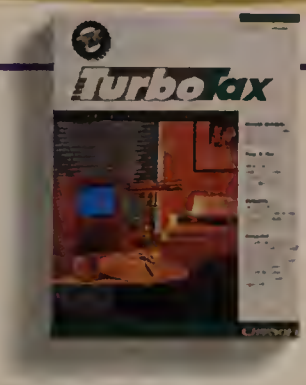

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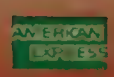

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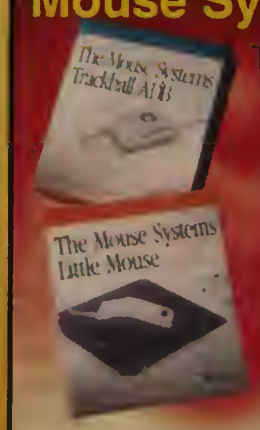

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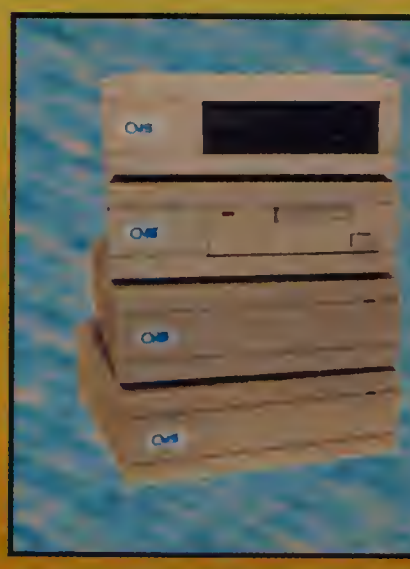

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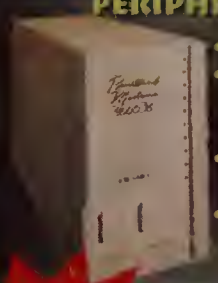

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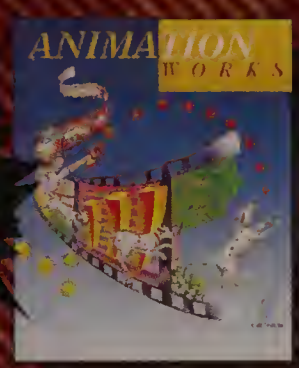

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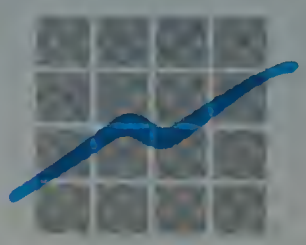

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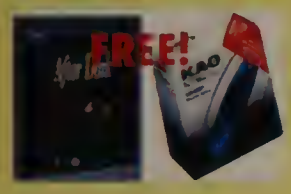

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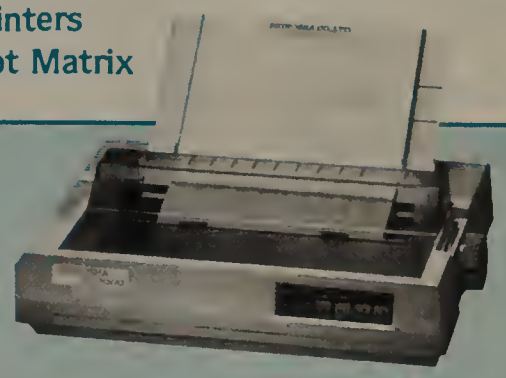

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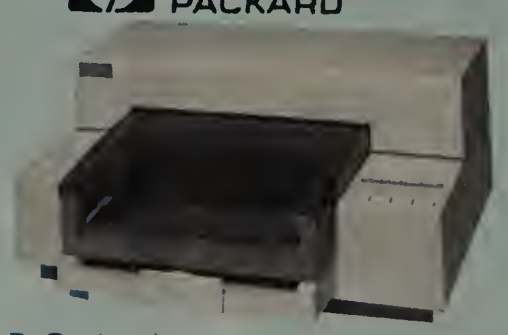

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Magic 24-bit color card 13" or 14"............$34[illegible]
Magic 19" 8-bit color card for II............$49[illegible]

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24-bit card & 14" NEC MacSync............$798
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24-bit card & 19" Triniton............$1595

Magic Scanners

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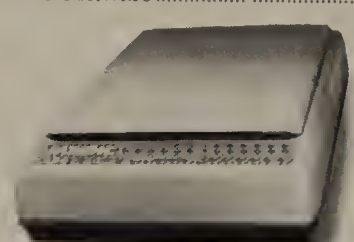

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MagicTape 525............$999
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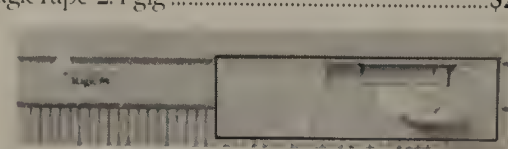

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Daystar PowerCache IIci 50mhz	Call
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MicroNet SCSI NuPort SCSI2	Call

Co-Processors

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[illegible] 16Mhz	99/199
[illegible] Mhz	249/299
[illegible]	399

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[illegible] 1 TK	4249
AppleShare	Call
[illegible] Frame D[illegible]	859
[illegible] Frame II	6[illegible]
[illegible] Frame DFT	[illegible]
[illegible] Mac	16[illegible]9
[illegible] NFS	1[illegible]99
[illegible]	114

HARDWARE

White Pine Exodus X Windows	329
White Pine Mac 240	131
White Pine Mac 241	195

CD Rom

Activision Manhole CD	47
BigTime TV	235
BMUG PD Rom Vol 1	52
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Grolier Electronic Encyclopedia	235
Lotus Market Place Business	556
Lotus Market Place Household	556

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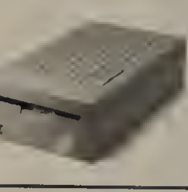

MacroMind CD ROM	[illegible]
[illegible] Office	[illegible]
NEC CDR[illegible] Drive Interface	[illegible]89
NEC [illegible] Art [illegible]	[illegible]49
NEC [illegible] PS	[illegible]

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Calcomp 12x18 Tablet	735
Calcomp 18x24 Tablet	1345
Calcomp WIZ Pen	53
Calcomp WIZ Tablet	139
Farallon MacRecorder	152
Farallon MacRecorder w/o soft	92
Farallon MediaTrack&MacRecord	315
Farallon MediaTracks	187
Kurta 8.5x11	251

Emulation/Translation

Dayna Dos Mounter	49
Insignia Access PC	78
Insignia SoftPC AT/Drive 1200/Rapport	665
Insignia SoftPC with AT EGA	339
Orange Micro Mac 286	1109

Mouse/Keyboard

Abaton Pro Point	87
Appoint Mouse Pen ADB	83
Curtis MVP Mouse	87
Datadesk Mac 101 ADB	129
Kensington TurboMouse	109
Keytronic MacPro Keyboard	117
LittleMouse ADB	76

Modems/Network/Communication

3 Com EtherLink/NB	425
3 Com Etherlink/SE	355
Abaton Interfax 24 [illegible]	429
Adaptec AHA SCSI Host	65
Adaptec EtherMac II Nubus	349
Adaptec Nodem E	349
AE DataLink External Fax MNP	24[illegible]
AE DataLink Internal 2400	[illegible]
AE DataLink MacPortable	1[illegible]9
AE Q[illegible]	[illegible]
Apple Ethernet Card	[illegible]
Asante Ma[illegible] + IIE ET	4[illegible]
[illegible] + SE E	[illegible]
Asante Ma[illegible] + SE30E	45
[illegible] Frame II Coax Gate	17[illegible]
[illegible] Box	[illegible]
[illegible] Card Ethernet	44[illegible]
[illegible] FaxPro	[illegible]

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Dayna EtherPrint Card	339
Dayna Net/4L	549
Dayna Port	345
Dayna Talk	96
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MagicNet Network	17
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Novell EtherPort SE,S[illegible]	44[illegible]
Nuvotech Nuvolink II	[illegible]
Nuvotech Nuvolink SC	[illegible]
Nuvotech TurboBridge	[illegible]
Nuvotech T[illegible]	1[illegible]
Orchid Technology [illegible] Fax Modem	4[illegible]
[illegible] Mac [illegible]	[illegible]
[illegible] Ether[illegible]	1[illegible]
[illegible] Fastpath 4	[illegible]
[illegible] 2400	4[illegible]
[illegible] V[illegible]	14[illegible]
[illegible]	[illegible]

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Shiva Telebridge	[illegible]
Telebit T1[illegible]00 [illegible] Baud	[illegible]
Telebit Trailblazer Plus 192[illegible] BPS	[illegible]
Tops/Sitca FlashBox	[illegible]
Tops/Sitca FlashCard	[illegible]
US Robotics [illegible] V.32 9600	[illegible]
US Robotics [illegible] HST Dual Std	[illegible]

Display/Video Systems

[illegible]	[illegible]
Calcomp [illegible] Bit System	[illegible]
Calcomp [illegible] Bit System	[illegible]
Computer Eyes B/W	[illegible]
Computer Eyes [illegible]	[illegible]
Koala MacVision	[illegible]
Lapis Display [illegible]	[illegible]
Lapis Display [illegible] SE	[illegible]
Lapis DisplayServer SE[illegible]	[illegible]
Magic 8 bit [illegible]	[illegible]
Magic 8 bit [illegible]	[illegible]
Magic 8 bit [illegible]	[illegible]
Mass Micro [illegible] FX	[illegible]
Mass Micro [illegible]	[illegible]
Mass Micro [illegible] 24	[illegible]
NEC [illegible] HC	[illegible]
Radius [illegible]	[illegible]
Radius Grey[illegible] Memory Exp	[illegible]
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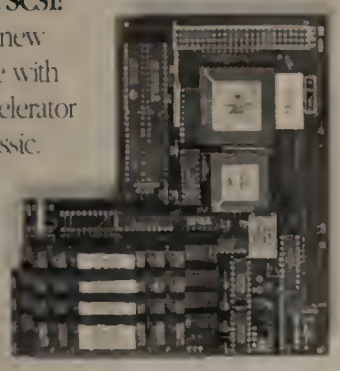

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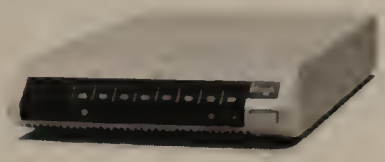

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RasterOps ClearView GS Mac II — 1549
RasterOps ClearView Mac II — 1099
RasterOps 24[illegible] — 2115
RasterOps Accelerator — 819
RasterOps FrameGrabber 324 — 1055
RasterOps SFX — 1055
Sigma ColorMax 8 24 19 — 4299
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[illegible] Scanview M21 — 519
[illegible] — call

Printers

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Apple Laser Writer Intx — 4199
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[illegible] Plotter — 3899
[illegible] Ribbon Printers — call
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[illegible]
HP DeskWriter — 725
HP [illegible] — 755
HP [illegible]
HP [illegible] IIF — 1[illegible]9
HP PaintJet — 1149
HP [illegible] — 23[illegible]9
Kodak [illegible] Printer 4 — 1[illegible]
Kodak [illegible] M[illegible] — 4[illegible]
M[illegible] — [illegible]
N[illegible] PS — 149
[illegible]
[illegible] HPII Cart — 449
[illegible] KX-[illegible] Laser Printer — 2[illegible]99
[illegible] — 1[illegible]9
QM[illegible] — 2149
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[illegible] — 1[illegible]9
[illegible] — 1[illegible]
[illegible]

Accesories, Disks, Ribbons

[illegible]

HARDWARE	
ImageWriter Black Ribbons	3
ImageWriter Color Ribbons	3
ImageWriter Multi Color Ribbon	11
Jet Fill Desk Jet Re-Fill	10
Mac Tilt/Swivel	22
MacDisk DS/DD Bulk 50	50
Monitor Cable Extension Kit	30
Monitor Stand Mac IIcx	47

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Sony DS/DD Box 10	10
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Sony DS/HD Box 10	19

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Postscript Laser Printers
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Sony DS/HD Bulk	2
[illegible] SE Carrying Bag	59
TI MicroLaser Toner Kit	41

Scanners

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[illegible]ere Twist Hand Scanner	485
HP Scan[illegible] w/Interface	1[illegible]99
Logitech Scan[illegible]	335
M[illegible] Scan 256 Grey	[illegible]99
M[illegible] Scan[illegible]zs	[illegible]649
M[illegible]S	1[illegible]99
M[illegible]tek MSF400GS	[illegible]
M[illegible]tek MS[illegible]terface	999

SOFTWARE	
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Sharp JX-450	5150
Sharp JX100	699
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Storage

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Acc Pac Simply Accounting	[illegible]
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Adobe Type Manager	[illegible]
Adobe Type Reu[illegible]on	[illegible]
Aft[illegible] Dark	22
Aldu[illegible] PageMaker 4	[illegible]
Carbon Copy Mac	[illegible]
Carbon [illegible] Mac Tool Pa[illegible]	[illegible]
[illegible]use Personal Progra[illegible]	[illegible]

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Claris CAD	559
ColorStudio	659
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Digital Darkroom	249
Disk Doubler	45
Disk Express II	45
Dos Mounter	52
Double Helix	369
Fileforce	249
FileMaker Pro	212
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Init Picker	42
Inside Information	69
Interleaf Desktop Publisher	699
MacProject II	3[illegible]5
MacroMind Director	399
Macromind Three-D	Ca[illegible]
MacSleuth	[illegible]77
Micro Planner	[illegible]9
MiniCad +	[illegible]
Norton Ut[illegible]ies	[illegible]79
OmniPage	[illegible]12
Persuasion	[illegible]
PhotoMac Edit	399
Pixar MacRenderMan	[illegible]
Pre Print	[illegible]1
Quark Express 3 [illegible]	[illegible]1
Re[illegible]spect Remote	[illegible]
SoftPC 3	243
SoftPC 3 EGA AT Bundle	[illegible]
SoftPC 1 3 Port[illegible]le	243
SoftPC EGA AT Option M[illegible]	[illegible]
StrataV[illegible]n 3D	[illegible]
Stud[illegible]	[illegible]
Super [illegible]	[illegible]17
Superf[illegible]t	[illegible]
S[illegible] Pro	[illegible]
Textpert	[illegible]
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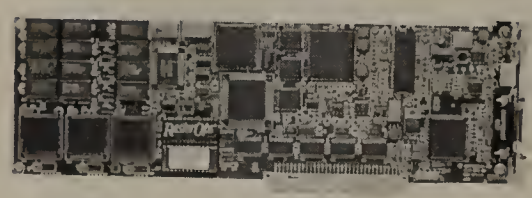

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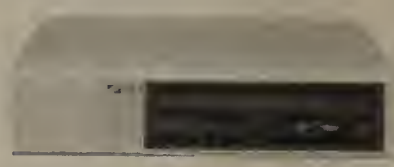

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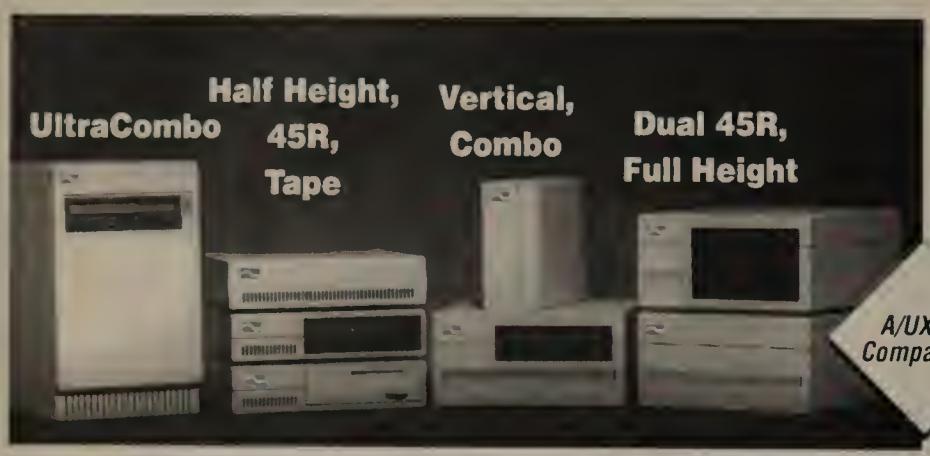

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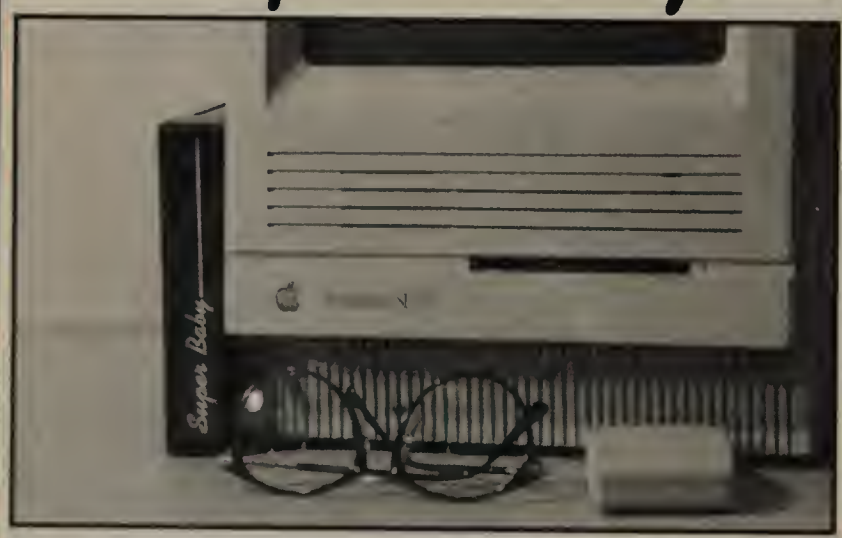

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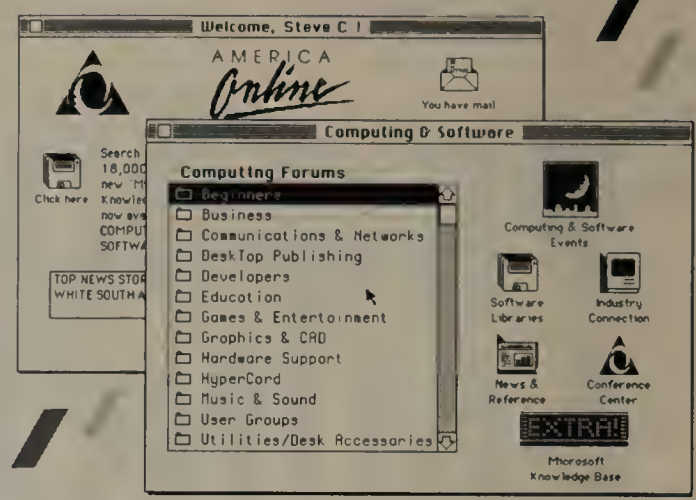

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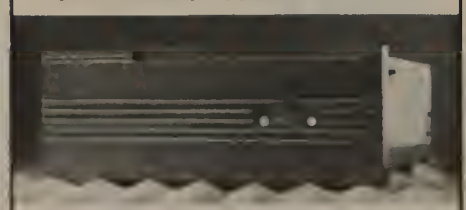

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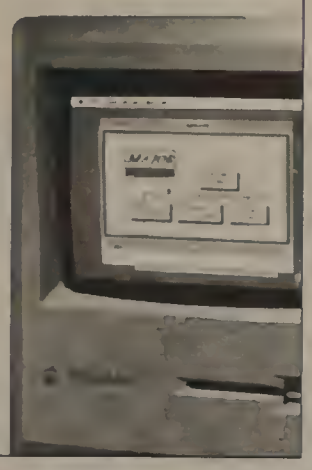

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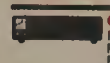

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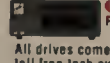

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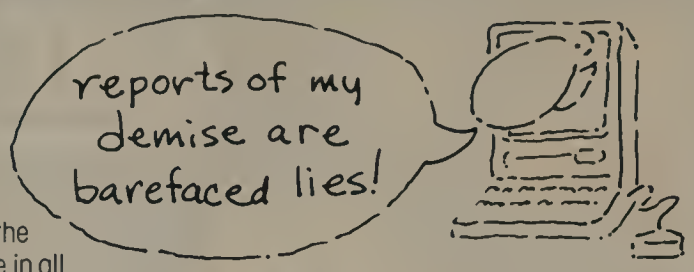

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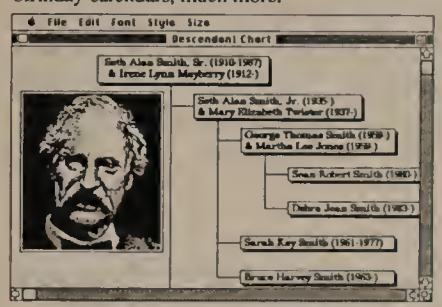

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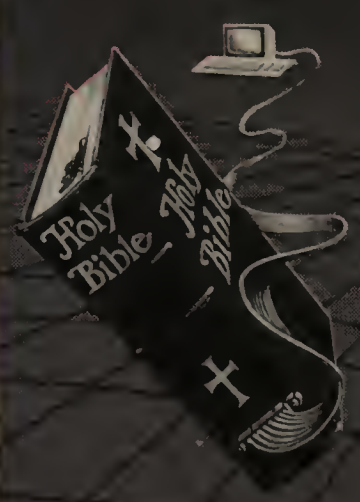

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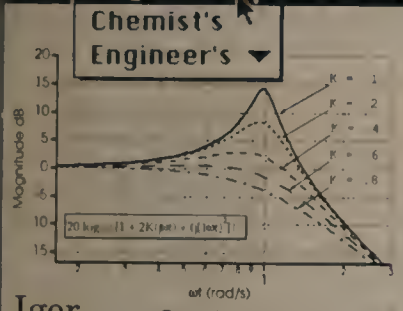

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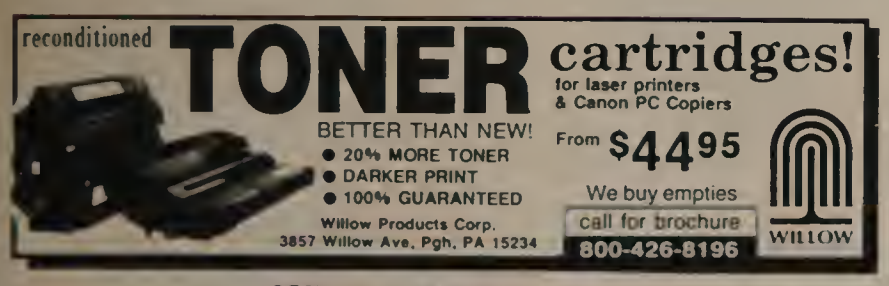

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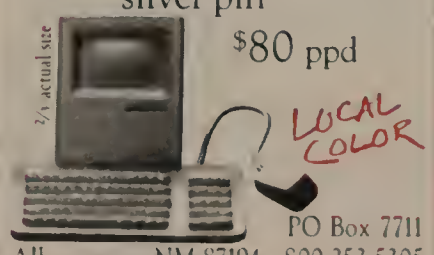

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Company Logo Specialist

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BUSINESS SOFTWARE

Months on chart	Last month	This month		
68	1	1	**Microsoft Word**	Microsoft Corporation
47	2	2	**Microsoft Works**	Microsoft Corporation
59	3	3	**Microsoft Excel**	Microsoft Corporation
55	4	4	**Aldus PageMaker**	Aldus Corporation
44	5	5	**MacWrite II**	Claris Corporation
20	7	6	**FileMaker II**	Claris Corporation
21	8	7	**QuarkXPress**	Quark
24	—	8	**WordPerfect**	WordPerfect Corporation
12	—	9	**Aldus FreeHand**	Aldus Corporation
52	—	10	**MacDraw II**	Claris Corporation

EDUCATION SOFTWARE

Months on chart	Last month	This month		
22	1	1	**Where in the World Is Carmen Sandiego?**	Broderbund Software
3	2	2	**Where in Time Is Carmen Sandiego?**	Broderbund Software
35	3	3	**Reader Rabbit**	The Learning Company
9	4	4	**Where in the USA Is Carmen Sandiego?**	Broderbund Software
49	—	5	**Math Blaster**	Davidson & Associates

ENTERTAINMENT SOFTWARE

Months on chart	Last month	This month		
13	2	1	**SimCity**	Spectrum HoloByte
11	1	2	**Tetris**	Spectrum HoloByte
5	4	3	**Welltris**	Spectrum HoloByte
22	3	4	**Falcon**	Spectrum HoloByte
45	—	5	**MacGolf**	XOR/PCAI

NETWORK/DATA COMMUNICATIONS

Months on chart	Last month	This month		
47	1	1	**TOPS**	Sitka Corporation
42	2	2	**AppleShare**	Apple Computer
4	3	3	**Timbuktu**	Farallon Computing
7	5	4	**Microphone II**	Software Ventures
27	—	5	**Phonenet**	Farallon Computing

MASS STORAGE*

Months on chart	Last month	This month		
3	—	1	**Platinum PI 40 (Internal)**	CMS Enhancements
9	—	2	**Apple Hard Disk**	Apple Computer
26	1	3	**MacStack SD20**	CMS Enhancements
13	4	4	**MacStack SD30**	CMS Enhancements
11	2	5	**MacStack SD40**	CMS Enhancements

ADD-IN BOARDS/MEMORY

Months on chart	Last month	This month		
2	1	1	**Macintosh Display Card 8•24**	Apple Computer
27	—	2	**Apple 1MB Memory Expansion Kit**	Apple Computer
3	3	3	**Pivot**	Radius
4	5	4	**Radius TPD Interface**	Radius
6	—	5	**ColorBoard 264**	RasterOps

UTILITY SOFTWARE

Months on chart	Last month	This month		
9	1	1	**SAM II**	Symantec Corporation
9	2	2	**SUM II**	Symantec Corporation
5	—	3	**Virex**	Microcom Software Division
3	4	4	**Norton Utilities for the Macintosh**	Peter Norton Computing
9	3	5	**Adobe Type Manager**	Adobe Systems

PRODUCT WATCH

Recent or forthcoming products of particular interest.

Animas True-Color Hand Scanner *Animas*
24-bit color hand-held scanner

Kodak Photo CD System *Eastman Kodak Company*
35mm film–to–CD ROM system scheduled for 1992

Lotus MarketPlace *Lotus Development Corporation*
CD ROM with marketing information on 7 million businesses

Source: Exclusive InfoCorp survey of more than 125 Macintosh retailers and selected mail-order vendors Covers sales during September1990.

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Circle 62 on reader service card

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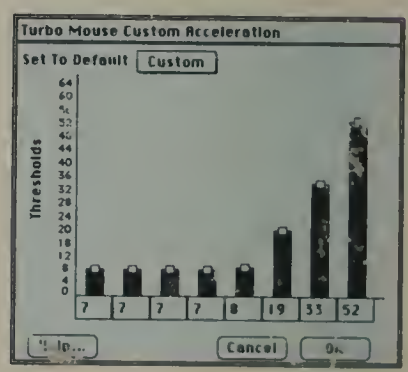

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